

DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES

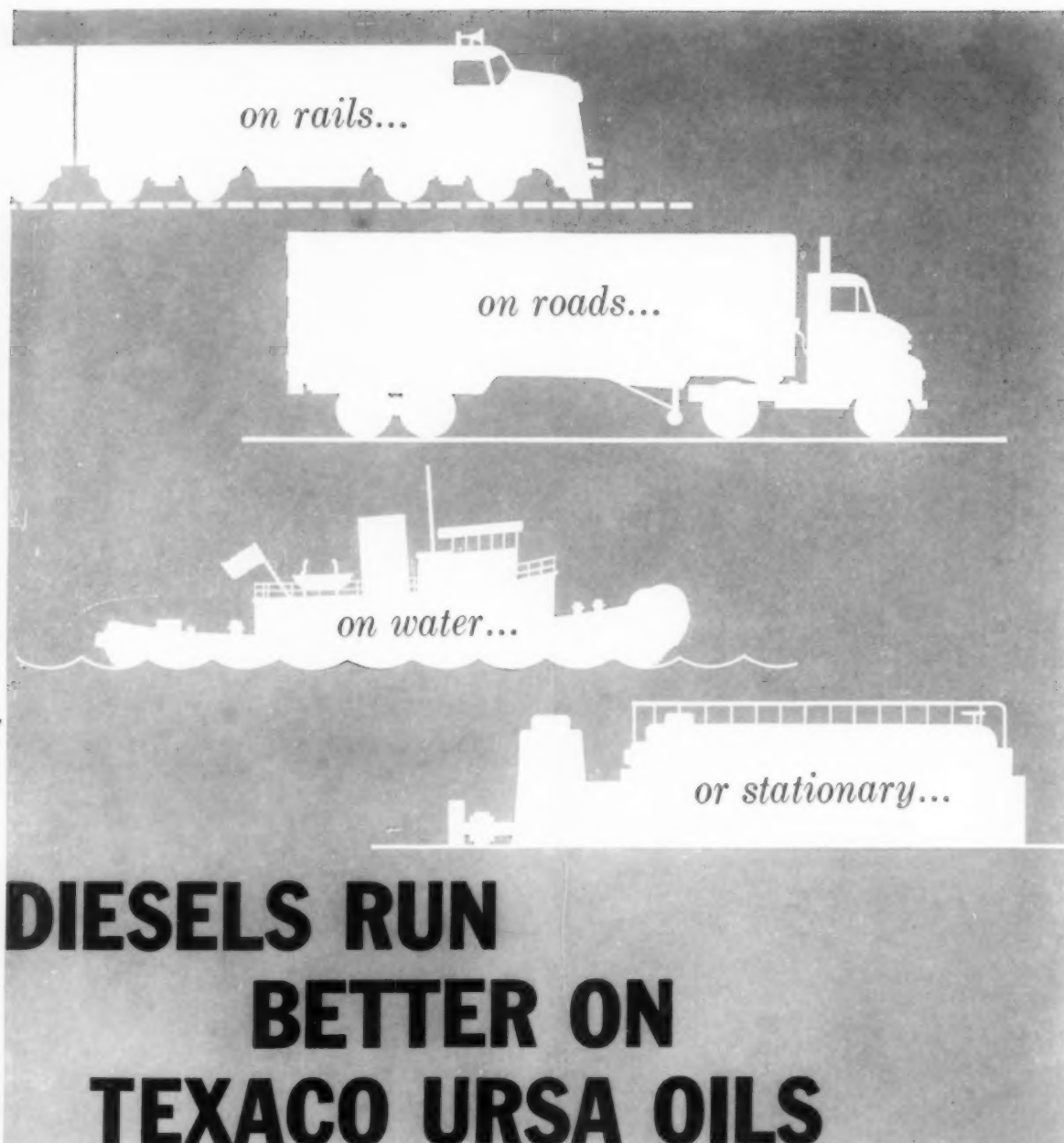
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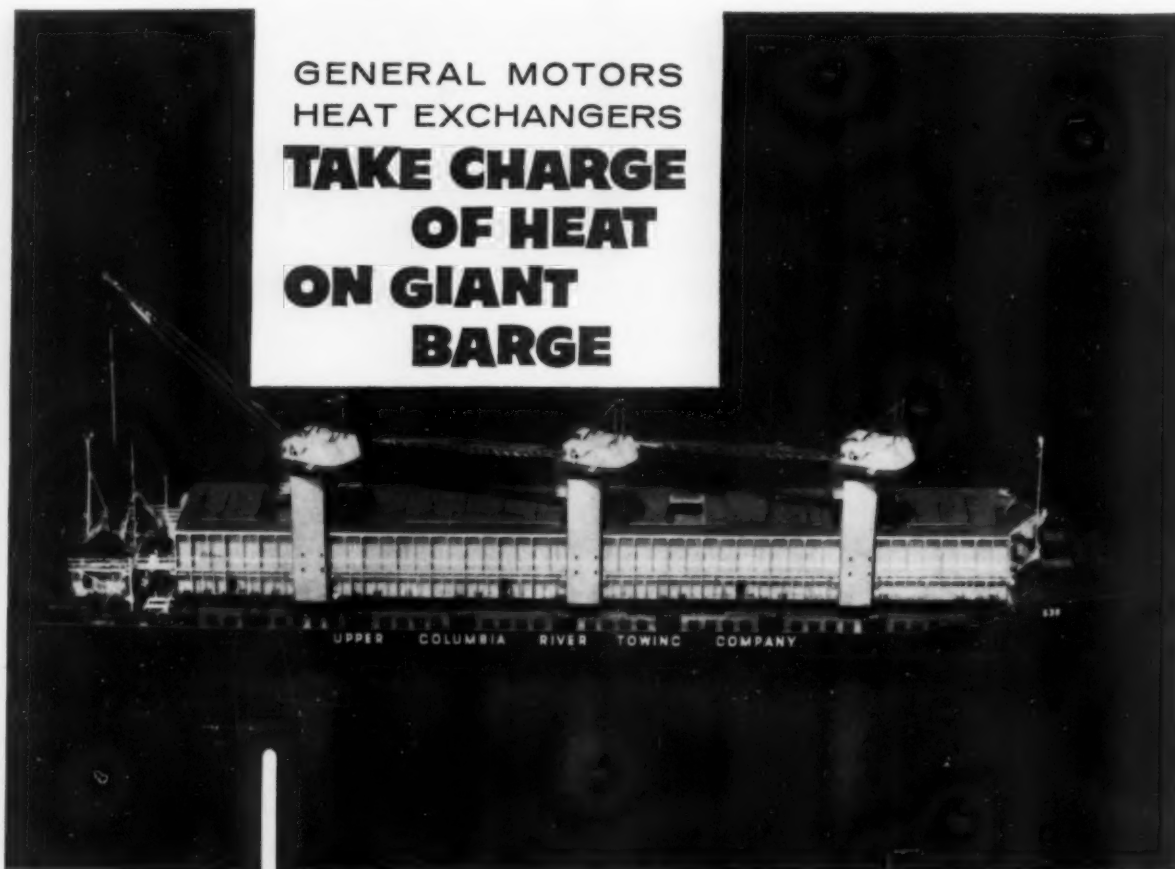


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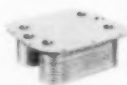
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**TAKE CHARGE
OF HEAT
ON GIANT
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DIESEL GAS ENGINE PROGRESS

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DIESEL ENGINES • DUAL FUEL ENGINES • NATURAL GAS ENGINES • GAS TURBINES

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FRONT COVER ILLUSTRATION

M/V Bedge, 150 ft. towboat, went into service for Midwest Towing Co., which operates on the Mississippi and Ohio Rivers. Here the Bedge is shown with a coal tow. A General Motors 1600 hp 16-567C diesel engine provides propulsion power.

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New complete information on engines & accessories!

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sell, operate or service diesel,
dual fuel, natural gas engines
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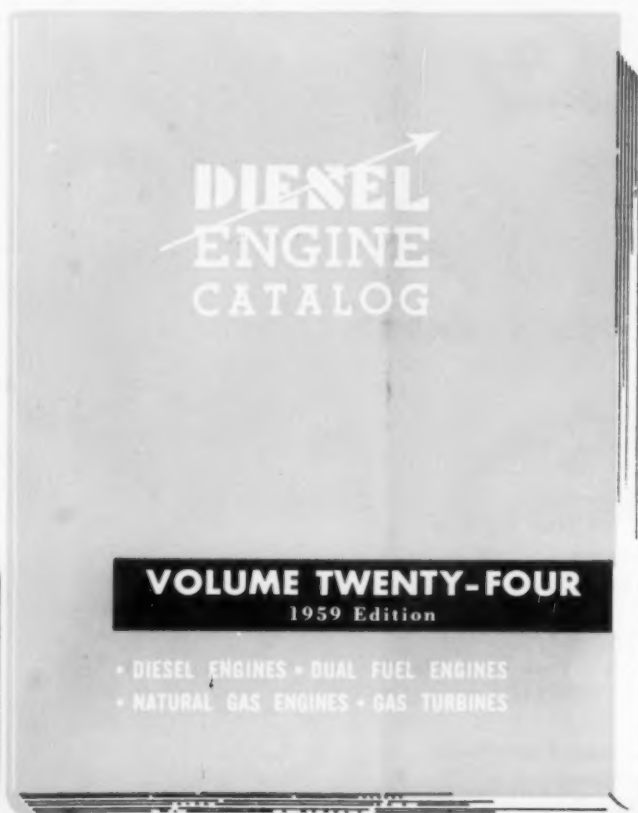
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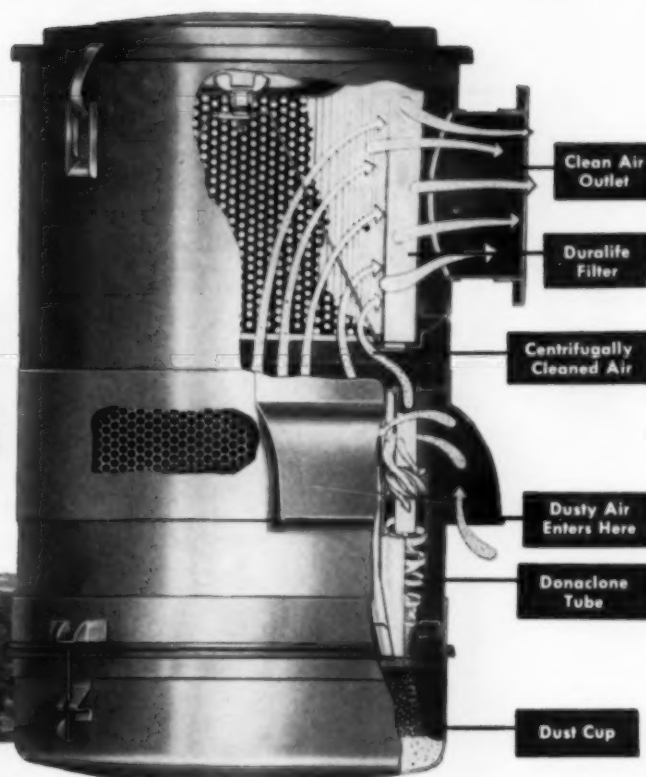
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Install Donaclones on your equipment and you practically eliminate engine wear due to intake dust!

Donaclones set new high standards for dust removal . . . prolong engine life far beyond what is now considered satisfactory. Many leading manufacturers are making Donaclones standard equipment on their heavy duty machinery.

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a new design centrifugal cleaner for the primary stage, which removes 98% of the dust before air reaches the paper filter.

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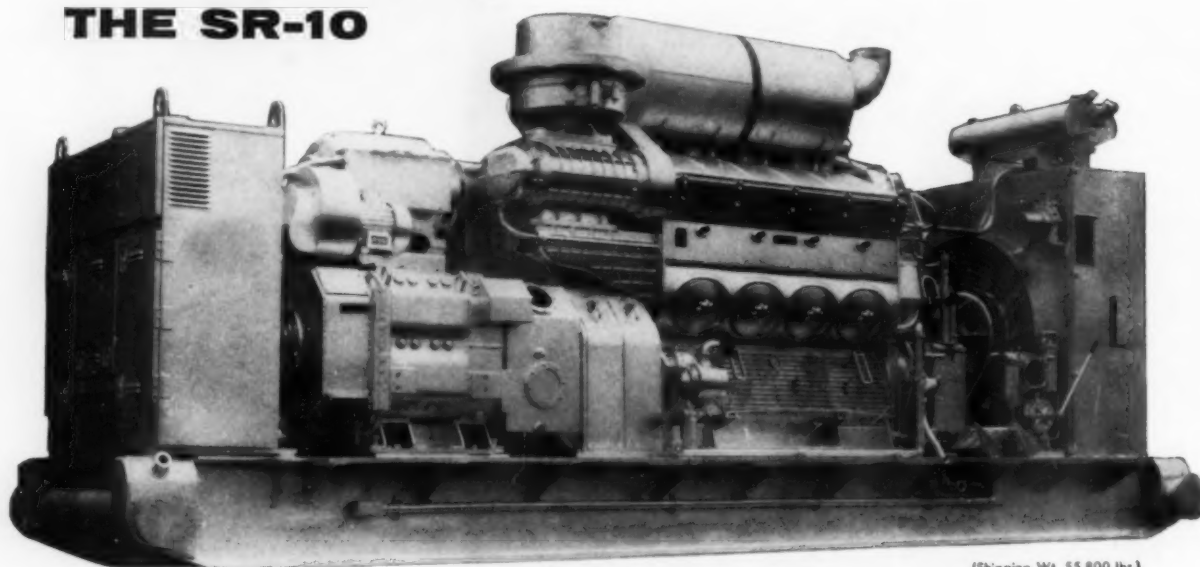
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ELECTRO-MOTIVE

—for deep drilling
THE SR-10



(Shipping Wt. 55,800 lbs.)

The standard of Diesel-electric power

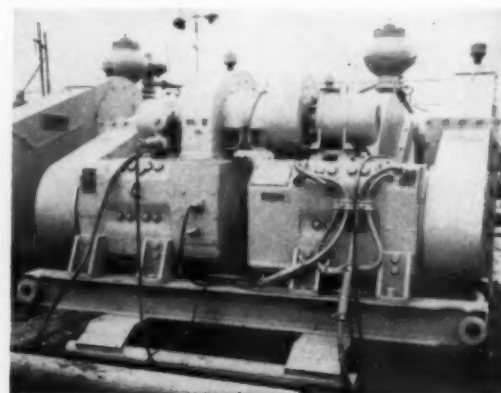
Electro-Motive power has been picked for more deep well applications than any other Diesel-electric system. Its record of dependability, low maintenance and economy, recorded under every conceivable operating condition, have made it the outstanding choice for both land and offshore applications. Most important, it is the *only* deep well Diesel-electric system manufactured and backed by one company.

The SR-10 is the newest Electro-Motive deep well power unit. It is the first standardized, completely self-sufficient power system. An integral AC generator eliminates need of outside AC power for blowers, excitation and control equipment. The 1000 hp 8-cylinder Diesel engine drives two generators that produce 640-KW each. Models are available for Dual-fuel operation.



Sensitive, accurate control

Controls for the SR-10 combine the "feel of steam" with the instantaneous response and accuracy of electric drive. Compact, centralized panel gives the driller supervision of all Diesel-electric equipment including safety shutdown.

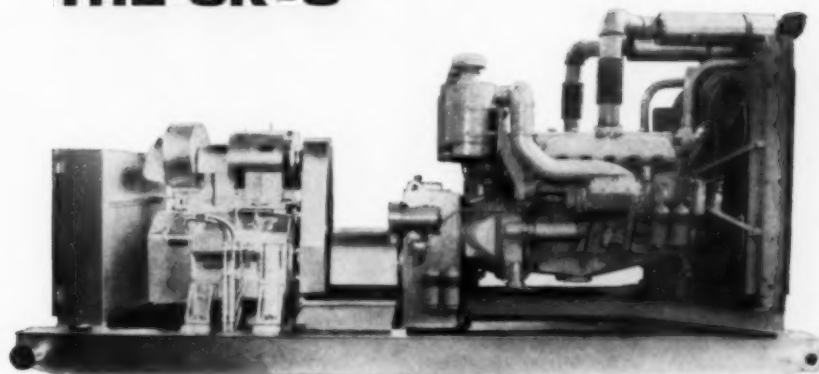


Flexible, positive power

Drive motors for the SR-10 deliver up to 800 hp. The D-49 motor provides smooth and rapid acceleration of loads with positive control of speed and torque. Both drive motors and generators are identical except for field windings, a factor that reduces service costs.

POWER

—for medium depth drilling **THE SR-5**



Simple, economical, adaptable

The SR-5 was specifically designed to meet the needs of medium depth drilling. It combines extreme simplicity of design in a compact, portable assembly that saves hours and dollars on rig-up, tear-down and moving operations. Though new in concept, the SR-5 contains the tested dependability, low operating and maintenance features of Electro-Motive SR-10 equipment.

The Basic SR-5 set is a two generator, two drive-motor arrangement. By combining units, drilling power can be tailored to the job for the most economical power arrangement. Skid unit is pictured with a Detroit Diesel engine, though any engine (gas or Diesel) of comparable power may be used.



Driller's Control

Simple control panel of SR-5 requires no special training or electrical knowledge. Sensitivity of controls permit driller to maintain a high drilling rate with complete accuracy and balance.



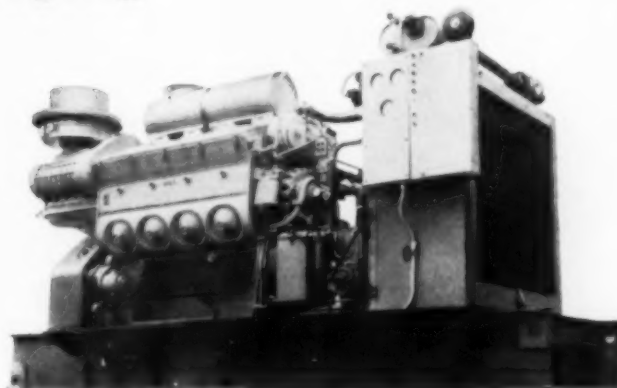
D-49 drive motor

The SR-5 utilizes standard and tested motor components. Electro-Motive drive motors are perhaps the most widely used electric motors for drilling applications. Their dependability and torque characteristics offer speed and power flexibility to meet all drive requirements.

—for dependable pumping **THE SK-10**

For large capacity pumping operations, the Electro-Motive SK-10 provides a compact and portable skid unit, complete with cooling system and engine controls. The seasoned 567 engine is well suited to the torque and horsepower requirements of pumping applications. The engine is balanced to eliminate any vibration between the set and accessories.

The dependability, low maintenance and economical fuel characteristics of the SK-10's engine have been inherited from General Motors' more than twenty-seven years of Diesel engine manufacture. SK-10 units are available for Dual-fuel operation and heat exchanger cooling.

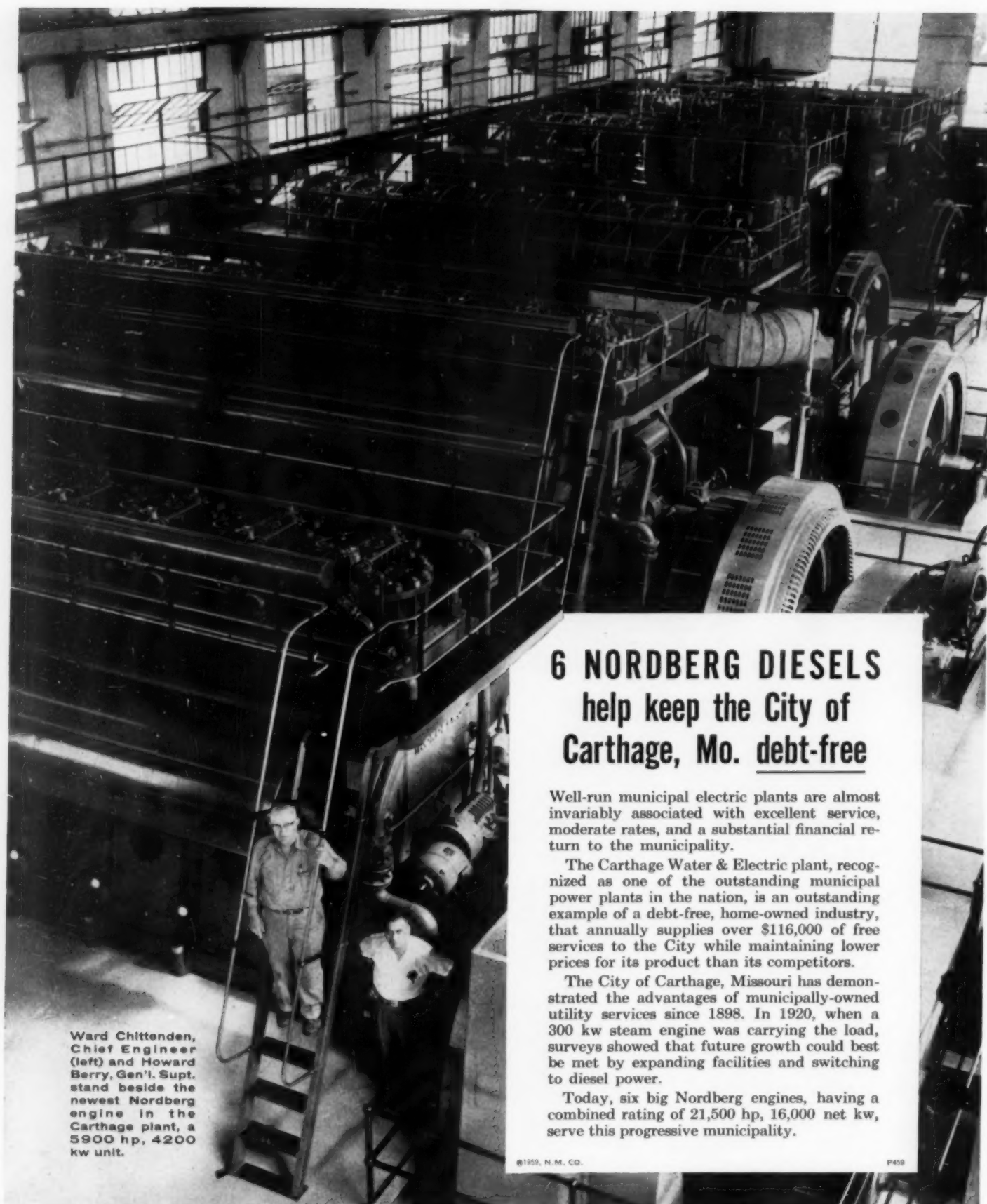


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ELECTRO-MOTIVE DIVISION • GENERAL MOTORS

LA GRANGE, ILLINOIS • **Petroleum sales offices:** Houston and Los Angeles

In Canada: General Motors Diesel Limited, London, Ontario



Ward Chittenden, Chief Engineer (left) and Howard Berry, Gen'l. Supt. stand beside the newest Nordberg engine in the Carthage plant, a 5900 hp, 4200 kw unit.

6 NORDBERG DIESELS help keep the City of Carthage, Mo. debt-free

Well-run municipal electric plants are almost invariably associated with excellent service, moderate rates, and a substantial financial return to the municipality.

The Carthage Water & Electric plant, recognized as one of the outstanding municipal power plants in the nation, is an outstanding example of a debt-free, home-owned industry, that annually supplies over \$116,000 of free services to the City while maintaining lower prices for its product than its competitors.

The City of Carthage, Missouri has demonstrated the advantages of municipally-owned utility services since 1898. In 1920, when a 300 kw steam engine was carrying the load, surveys showed that future growth could best be met by expanding facilities and switching to diesel power.

Today, six big Nordberg engines, having a combined rating of 21,500 hp, 16,000 net kw, serve this progressive municipality.

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P459



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If you are faced with the problem of torsional vibration from impulses within the operating range, Dana engineers may be able to help you solve your design problems.

Spicer resilient propeller shaft assemblies have been used successfully for years in rapid transit cars, street cars, engine dynamometer, truck, bus, earthmover and passenger car applications to solve difficult torsional problems.

Spicer rubber-cushioned shafts make it possible for design engineers to "tune out" the vibration and thus produce commercially acceptable installations.

Spicer rubber-cushioned propeller shafts offer these additional advantages:

- 1 The torsional flexibility limits the effect of high impact loads resulting from rough shifts and other sudden torque changes.
- 2 The cushioning effect prevents clatter, rattle, and backlash noises.
- 3 Increased life of bearings, gear teeth, splines, and other components due to the reduction of high impact and torsional loads.
- 4 Reduction of noise transfer.
- 5 Axial flexibility to cushion forces resulting from length changes.

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International 295 Payscraper, equipped with a Spicer rubber element shaft, at work on the Interstate Highway System.



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AIRESEARCH

is now turbocharging Union Pacific's heavy duty, 2-cycle GP9 diesel with four T3006-01 turbochargers. This application of multiple turbocharger systems on this type of locomotive has already accumulated more than 1.5 million turbocharged miles. Its important advantages are:

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- Substantially increased engine horsepower at all altitudes
- Lower engine fuel consumption
- Higher air flow through the engine, allowing the use of heavier grade, cheaper fuel
- Cooler engine exhaust

- Engine exhaust free of smoke and sparks
- Turbochargers easier and less costly to maintain

AiResearch is a world leader in the development and production of air-cooled turbochargers and turbocharger controls for all major diesel engine applications. More than 35,000 AiResearch turbochargers now deliver close to 9 million turbocharged horsepower. Your inquiries are invited.



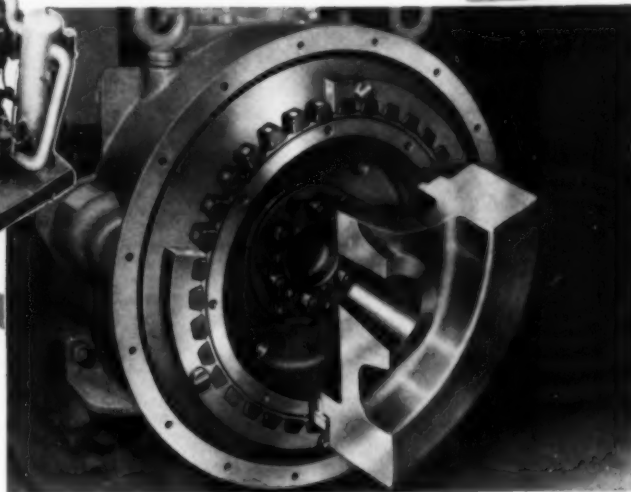
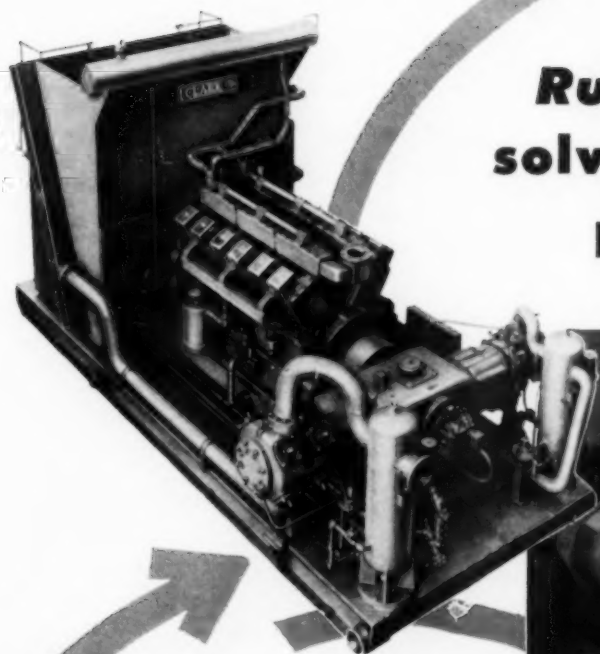
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DIESEL AND GAS ENGINE PROGRESS

TWIN DISC Rubber Block Drive solves alignment problems...



on CLARK packaged Field Compressors

Designed for oil and gas field applications, Clark Model CFA and CFB Compressors are "unitized" stations with the compressor, engine, radiator and all other essential auxiliaries mounted on a structural steel skid. Thanks to Clark's balanced/opposed design which equalizes the weight distribution of opposed masses, operating speed is not limited by the stress resulting from unbalanced forces. With a maximum speed rating of 1000 rpm, Clark Compressors can be directly coupled to conventional en-

gines without resorting to often troublesome belt or gear drive.

To connect the compressor to the engine, Clark uses Twin Disc Rubber Block Drive, a simple but highly effective coupling proved by over ten years of field service. The annular ring "gear" with rubber covered "teeth" is bolted to the compressor flywheel.

The Rubber Block Drive compensates for both angular and parallel misalignment and also cushions out shock loads. It operates without lubrication or attention of any kind. And elimination of drive belts and gears helps boost the compressor's mechanical efficiency as well.

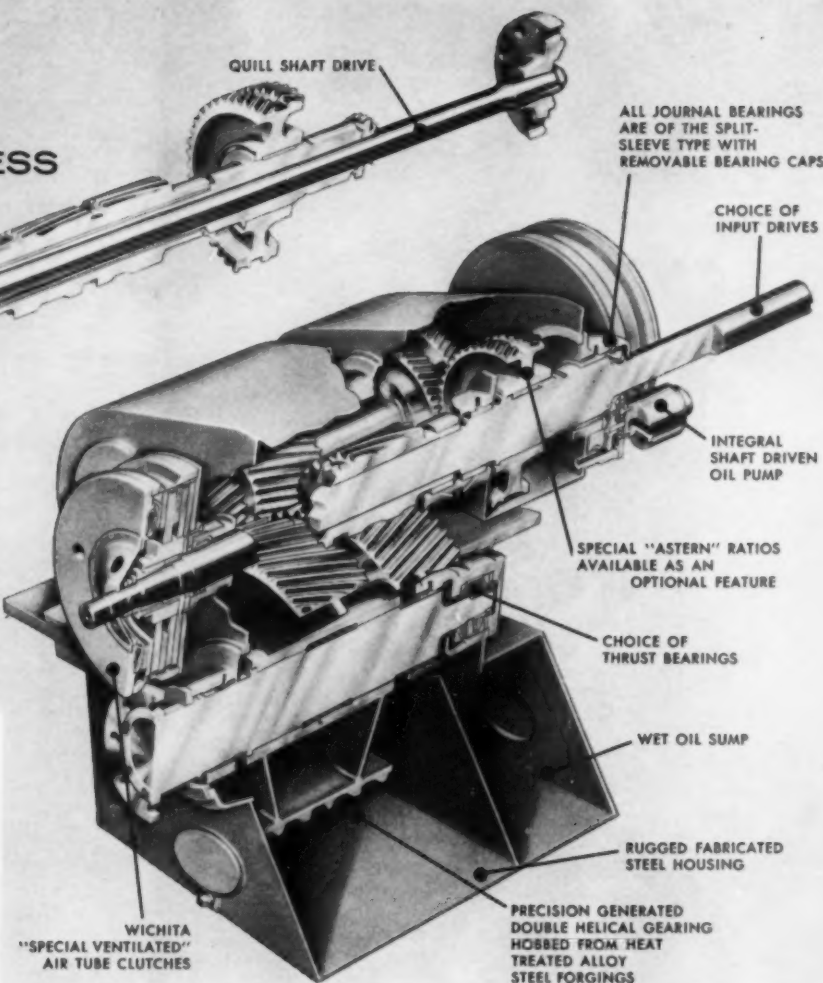
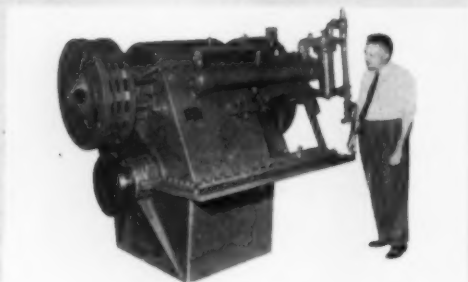
Manufacturers of all types of engine-driven equipment have found Twin Disc Rubber Block Drive the perfect antidote to misalignment problems. Maintenance invariably goes down with Rubber Block Drive on the job. For full details, write our Racine office or contact your Twin Disc Field Representative.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois

On the long run—
QUALITY COSTS YOU LESS

WESTERN GEAR
Sea-Master PCMR
**QUALITY MEANS
 OWNER PROFIT**



LOWER INSTALLATION COST. The exclusive PCMR design permits installation without costly sub bases, stub shafts, extra pillow block bearings. Positive housing alignment is assured through Western Gear's exclusive three-point suspension during installation. Independent clutch mounting, another Western Gear exclusive feature, eliminates stub shafts and pillow blocks, minimizes engine gear alignment problems. Exclusive quill shaft drive or standard drive permits easy torsional tuning often eliminating torsional problems without the use of expensive special flexible couplings.

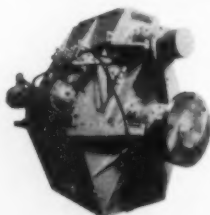
LOWER OPERATING COST. High efficiency precision manufacture guarantees low power loss through PCMR. Factory tests show maximum losses within 1% per cent making more horsepower available at the propeller. Conservative design and

service factor protection assures long life.

LOWER MAINTENANCE COST. Exclusive outside clutch location simplifies clutch servicing, guarantees maximum air flow for good cooling. Positive clutch alignment by independent support on gear unit instead of between gear and engine reduces both spline and plate wear and eliminates possible damage to gear or engine due to misalignment. Exclusive use of split-sleeve type journal bearings — renowned for long life and high efficiency — with removable bearing caps permits easy inspection or repair of bearings. Mounting in ship on extension of lower housing split line flanges permits complete disassembly without disturbing machinery alignment.

Don't be fooled with imitations. Insist on genuine Sea-Master quality.

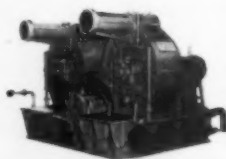
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Straight reduction gear
 Type MGv;



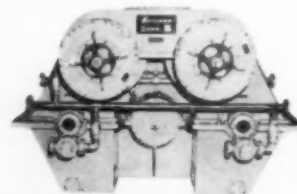
Hydraulic reverse &
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Multiple pinion PCMR.



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SUPERIOR MARINE DIESEL FACTS

...to help you compare, decide, specify!



fact ... hundreds of compact, heavy-duty Superiors are now powering tow boats, tugs, dredges, river boats, large fishing boats, and other work boats.

fact ... Superiors range from 215 to 2150 HP, are built as four cycle, six or eight cylinder, vertical, in-line engines, naturally aspirated or supercharged. Available as propulsion engines, standard or custom-built generator sets (150 to 1500 KW) and diesel-electric propulsion systems.

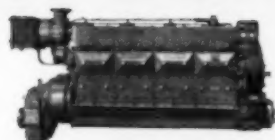
fact ... special engineering service on every installation includes torsional analysis of engine, gear, shaft and propeller as a complete system. White Diesel sales and service points are located throughout United States and Canada.

fact ... because of extreme design simplicity, conservative HP ratings, and elimination of high mortality parts, Superiors perform dependably, with low maintenance and few parts replacements, over extremely long periods.*

fact ... Superior's open chamber combustion system and many design refinements assure maximum fuel economy ... up to 35% fuel savings, compared with performance of other engines in very similar hulls.*

*Supporting case histories furnished on request.

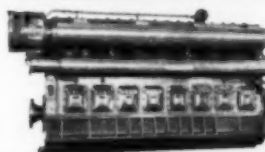
model 40



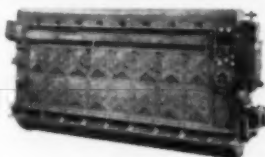
model 60



model 65



model 80



Model	Cylinders	RPM	Naturally Aspirated		Supercharged	
			HP	KW	HP	KW
40-6	6	600-1100	215-460	150-315	325-775	225-540
40-8	8	600-1100	290-620	200-425	435-1025	300-700
60-6	6	360-514	410-530	290-365	615-950	415-650
60-8	8	360-514	515-705	350-500	875-1250	600-825
65-6	6	500-600	580-720	400-500	1105-1600	760-1120
65-8	8	500-600	775-960	530-650	1470-2150	1025-1500
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80-8	8	300-375	800-1040	550-700	1200-1900	800-1250

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White Diesel

WHITE DIESEL ENGINE DIVISION
THE WHITE MOTOR COMPANY
Plant and General Offices: Springfield, Ohio

Michigan-Ohio News

By Jim Brown

CUMMINS Diesel Michigan Inc. of Dearborn, Mich. reports that they have delivered a 50 kw Marathon generator set powered with a Cummins HRC-4-I diesel engine to the Boys Vocational School at Whitmore Lake, Mich.

WOLVERINE Tractor and Equipment Co. recently sold an International Harvester TD-15 diesel tractor to M. L. Chartier, general contractor at Fair Haven, Mich.

A model 95 Northwest 60 ton pull shovel equipped with a 3 yd. bucket and powered by a Murphy model 21 diesel engine was recently sold to Angelo Di-

ponio of Detroit. Sale was made by Cyril J. Burke, Inc. of Detroit.

THE R. G. Moeller Co. of Detroit reports sale of a Lorain model L-56K utility crane (30 ton) with a "joy" stick and shear ball mounting, and powered by a GM model 4-71 diesel engine with torque converter. The new crane was purchased by Gargaro Co. of Detroit

and will be used on a sewer project for the city of Detroit.

THE Miller Equipment Co. of Livonia, Mich. has sold a model 180 Michigan tractor-dozzer to Townsend & Bottum, Inc. of Ann Arbor. The new tractor will be used in construction of a Consumers Power Co. building at Port Sheldon, and is equipped with a Cummins JT-6-BI diesel engine.

FRANK Beatty, contractor at Royal Oak, Mich. recently took delivery of an IH TD-9 diesel tractor from Wolverine Tractor and Equipment Co. of Detroit and Grand Rapids.

CYRIL J. Burke Inc. of Detroit has recently delivered a Pettibone-Mulliken model 440 front-end loader to Ford's River Rouge plant. The new loader will be used in re-handling iron ore. It has a 4 yd. bucket which enables it to move 5,000 lbs. per load. It is also equipped with a 2 way radio, heater, 23½ x 25 tires and hard surfaced teeth. Power is by a GM 4-71 diesel engine.

TOWNSEND and Bottum Inc. of Ann Arbor, has purchased a Koehring model 34E twin batch paver. The new paver is powered by a GM 4077C diesel engine and was sold by Earle Equipment Co. of Detroit.

AN International Harvester TD-9 diesel tractor with Drott 4-in-1 front end equipment was recently delivered to Bars Product Supply Corp. of Holly, Mich. by Wolverine Tractor and Equipment Co.

A Pettibone-Mulliken model 250 with a 3¼ yd. loader and GM 4-71 diesel engine was recently delivered to Otto Taylor of Saginaw, Mich. The new loader will be used for general excavation work and was sold by Cyril J. Burke, Inc. of Detroit.

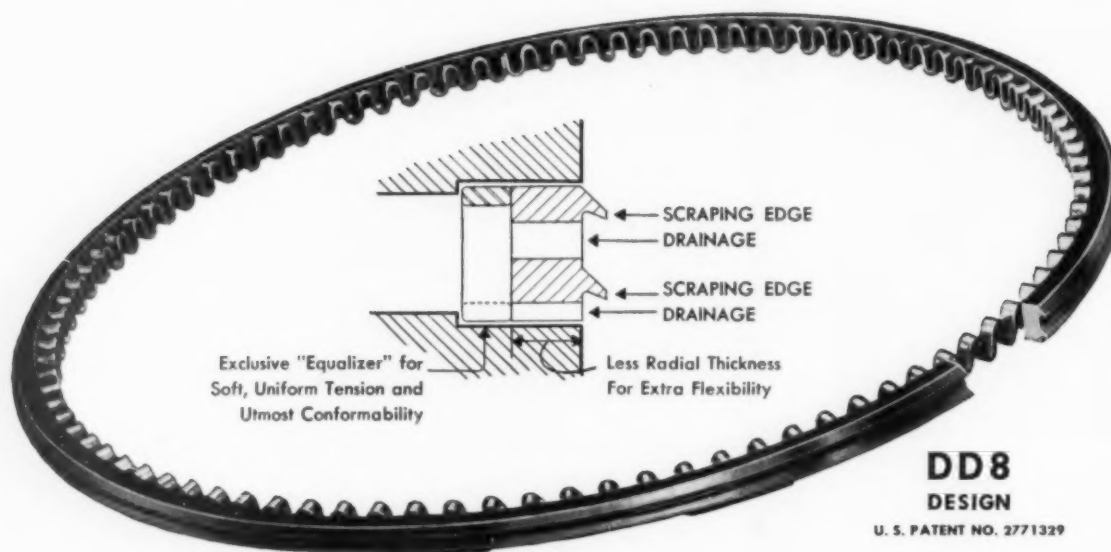
PENINSULAR Diesel Inc. of Detroit has announced their first installation of the new GM Series 6V-71 diesel engine . . . a model 7067 which was installed in a Ford F-800 truck. The installation replaced a gasoline engine and was done for W. Nelson of Flint, Mich.

AMERICAN Aggregates Corp. of Kalamazoo, Mich. has accepted delivery on a new Allis-Chalmers model HD11G diesel tractor shovel (2¼ yd.). Sale was made by Earle Equipment Co. of Detroit.

A Northwest model 25D lifting crane with an 18 ton lifting capacity, 45 ft. boom, crawler tracks and powered by a GM 3-71 diesel engine was recently sold by Cyril J. Burke Inc. of Detroit. The crane was purchased by Darin & Arm

Another PEDRICK "First"

A Single-Piece Cast Iron Conformable Oil-Control Piston Ring with TWO Scraping Edges and Drainage Under Each!



Pedrick Conformable FORMFLEX Double-Drain Oil Ring

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Pedrick PISTON RINGS

PEDRICK PIONEERED *Conformable* RINGS FOR BIG-BORE ENGINES

strong Co. of Detroit and will be used in the construction of a Dundee cement plant at Dundee, Mich.

A new IH TD-15 diesel tractor-dozzer, purchased through the Grand Rapids office of Wolverine Tractor and Equipment Co., is being broken in by H. H. Shinville, general contractor of Kalamazoo.

THE J. R. Panelli Equipment Co. Inc. of Oak Park, Mich. has announced that they now have available the new Worthington model 85 Blue Brute rotary type portable air compressor.

A Northwest lifting crane with a 40 ton capacity, (70 ft. boom) and powered by a Murphy model 12 diesel engine was recently delivered to Townsend & Bottom, Inc. of Ann Arbor. Sale was made by Cyril J. Burke Inc. of Detroit.

JAMES Robinson of Rosebush, Mich., recently put to work a new International Harvester TD-9 diesel tractor-dozzer purchased from Wolverine Tractor and Equipment Co.

AN Austin-Western Super 88 grader powered by a GM 3-71 diesel engine with torque converter and equipped with a scarifier and cab was recently sold by the R. G. Moeller Co. of Detroit to Washtenaw Asphalt Co. in Ann Arbor.

THE Great Lakes Steel Co. of River Rouge has accepted delivery on a Hercules model DD 226 diesel engine for use as a power unit in operating their open hearth furnaces. The sale was made by Cyril J. Burke, Inc. of Detroit.

THE City of Pontiac (Michigan) has accepted delivery on a new Huber-Warco model 10-D grader. The grader was purchased from Miller Equipment Co. of Livonia, Mich. and is powered by a GM 4-71 diesel engine with a Detroit transmission. Other features are tandem drive; 6 speeds forward and reverse; hydraulically cab-controlled blade movement up to 90° either side for bank sloping, constant mesh transmission. The new grader is also equipped with a scarifier and weighs 23,550 lbs.

Diesel and Gas Engine Progress Moves Executive Offices

The executive offices of DIESEL AND GAS ENGINE PROGRESS have been moved to 9110 Sunset Blvd., Los Angeles, Calif. The editorial and production offices of the magazine remain at 1701 W. Wisconsin Ave., Milwaukee, Wis.

The Los Angeles office will continue to handle all advertising and editorial material relating to the DIESEL AND GAS ENGINE CATALOG. Material for the monthly magazine will be processed through the Milwaukee office.

Expand Engineering Department

Expansion of the Stewart & Stevenson Services, Inc. engineering department, both physically and in its areas of operation, has been announced by E. E. (Slim) Childress, Stewart & Stevenson operations manager. The company's engineering section is now housed in new

quarters in Houston, Tex. and is part of the recently acquired property adjacent to the headquarters plant. Expansion of engineering was necessary because of the demands of several industries for more and more custom designed equipment, Childress said. In the past 12 months, Stewart & Stevenson has greatly widened the scope of its power application work by contracting complete, turn-

key jobs. Recent examples of this include the manufacture of a giant oilfield blender, said to be the world's largest, built from the ground up for The Western Co., of Ft. Worth, Tex.; a 1300 hp sand fracturing unit for the same firm; a marine wireline service vessel for Fra-Sar de Venezuela now being completed; in addition to numerous large diesel generator applications.

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Judge any way you like: test results or mechanical and operating department records. You'll find that "RPM DELO" reduces wear and keeps engines clean between regular overhauls. That's why Southern Pacific, like so many other major Western Railroads, continues to use RPM DELO Oil.

Longer service life was the objective more than 20 years ago, when Standard Oil Company of California developed

the first successful compounded oil for high-speed diesel engines.

Though rudimentary by present-day standards, this first "RPM DELO" lowered operating costs to economical levels, stimulating diesel engine design.

By preventing ring sticking, reducing engine wear, and maintaining a satisfactory level of overall engine cleanliness, RPM DELO Oil quickly won approval of engine manufacturers.

Constant research, both independently and in cooperation with SP and other forward-looking railroads, has kept "RPM DELO" ahead of diesel engine design and use.

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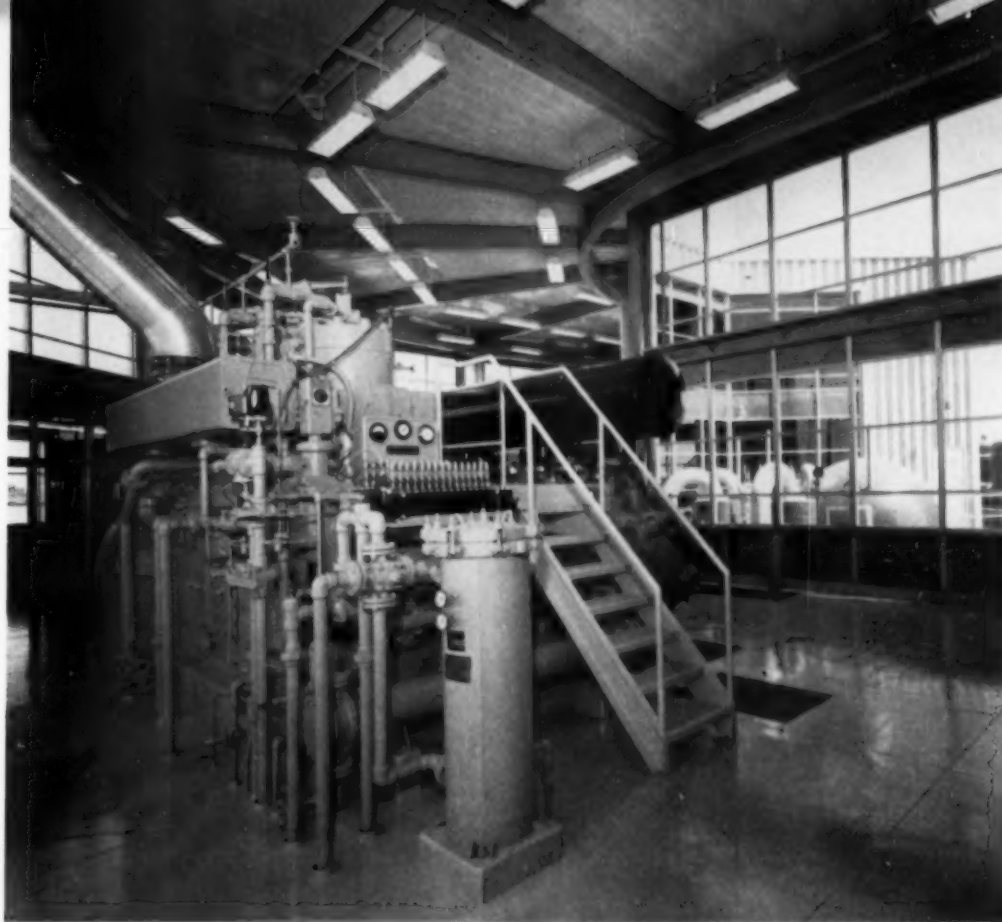
PUSHBUTTON COMPRESSOR STATION

**Long Beach, Calif.,
Plant No. 6 Built
Around Suction
Sphere in Unique
Design Concept**

By JAMES JOSEPH

PUSHBUTTON controlled, the city of Long Beach (Calif.) compressor station no. 6 is on the line. And so are the station's four 550 hp Clark HSRA-4 gas engine driven reciprocating compressors, its consoled-valved piping complex and its big gasholder (214 ft. in dia., 174 ft. high, capacity 5 MMcf) said to be the world's largest dry seal type holder. But the spanking new \$2.5 million station, whose 1.5 MMcf/hr. capacity ups Long Beach's system total some 25 per cent, is as unique flow-wise as it is uniquely automated; the plant is built around a 10 ft. dia. suction sphere which replaces, and largely substitutes for, normally long and costly suction headers.

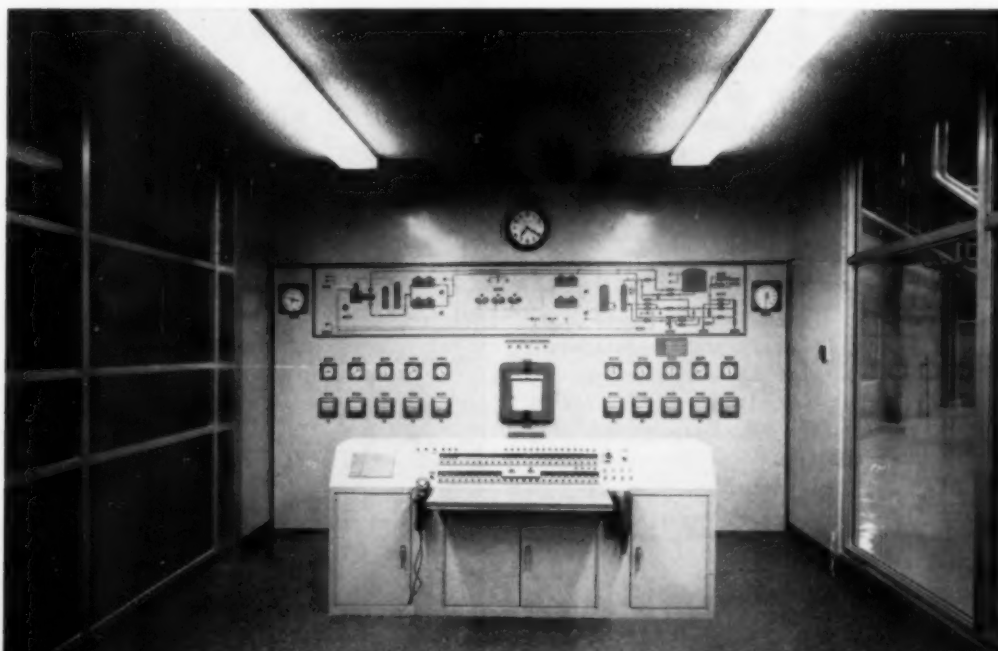
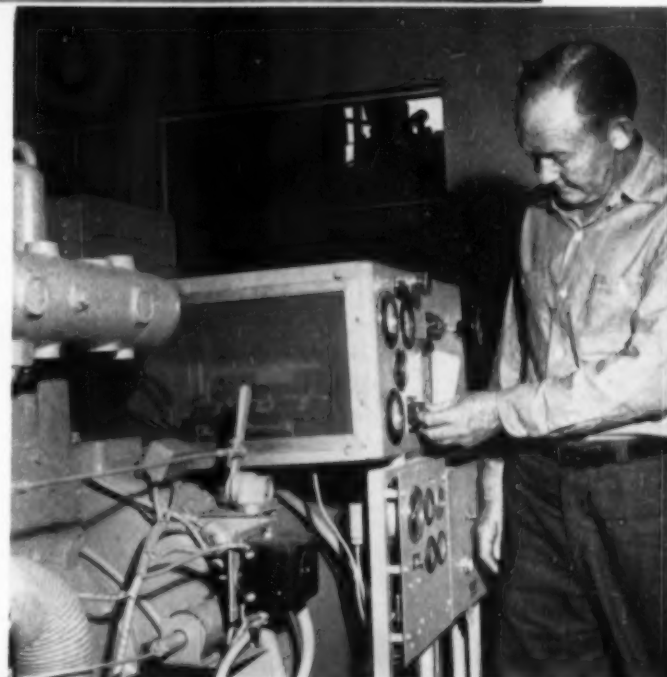
"The suction sphere," points out Gas Dept. superintendent Leonard L. Bendinger, "is the hub of things". And, in fact, it is. Like the hub of a wheel, the sphere supplies the 4-cylinder Clarks via short-run 12 ft. suction laterals—possibly the shortest, most efficient flow design ever incorporated into a compressor plant. Discharge to a single, circular header is equally short-run, 12 ft., as for the suction laterals. Designed by consulting engineers M. A. Nishkian & Co., station no. 6 goes literally around in circles—with economic purpose. Installed in a semi-circle within the octagonal-shaped compressor building are the four Clark engines. Circular, too, is the closed, doughnut-



Each Clark compressor is served by Hilco Hyflo lube oil filter (standing, foreground), and with spark ignition by American Bosch.

Station operator checks controls on facility's emergency, gas fueled electric set.

Systems schematic and supervisory console are dual control devices for this, perhaps the most automated compressor station in the U.S.



shaped, 24 in. dia. discharge header—into which the four compressors discharge via their short laterals. Dead-center of the "doughnut" rears the big volume, low pressure (max. about 50 psig) suction sphere—which receives natural gas either from the big holder or, in some cases, directly from the plant's scrubber.

But plant no. 6's purposeful wheel-and-hub design doesn't end with the compressors and suction sphere. Ringing the compressors are auxiliary rooms and their gear: an Ingersoll-Rand ES-2, two stage air compressor driven by a 25 hp motor (supplying instrument and engine-start air) and a gas-fueled 100 kw emergency electric set (its Waukesha 145-GZ natural gas engine driving a Fairbanks-Morse generator). The HSRA-4 Clarks, with



Graphic wall-wide schematic confirms action of supervisory console whose pushbuttons control valves, motors, fans—centralizing and completely automating distribution.

The four HSRA-4 Clarks shown ringed in a circle around the suction sphere (through window, right,) which serves them through equal-length, short run discharge suction laterals. Exhaust silencers are concealed on roof of compressor building.

Ringed the compressors are the auxiliary rooms and their gear: an Ingersoll-Rand ES-2, two-stage compressor driven by a 25 hp motor and a gas-fueled 100 kw emergency electric set with a Waukesha 145-GZ natural gas engine driving a Fairbanks-Morse generator.

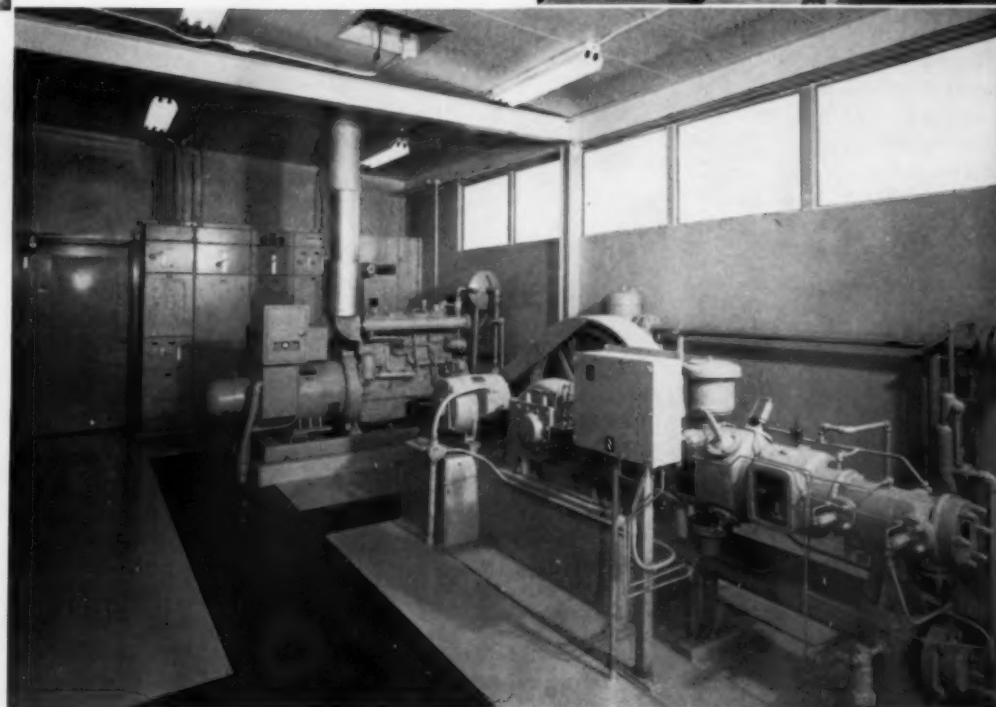


a bore of 14 in. and rated 550 hp at 300 rpm, exhaust through silencers concealed atop the plant roof. Each engine is equipped with a lube oil filter, and a lube oil cooler (supplied cooling water via two evaporative units, which also supply the engine's jacket water exchangers. Fuel gas to the spark-ignition compressor engines routes through a meter, thence to the compressors and to the standby electric set. Fuel gas is injected at a minimum 15 psig. Jacket water is dropped 10 degrees through the induced draft coolers, the inlet temperature about 160 degrees F, the outlet 150 degrees. Lube oil temperature is dropped from an entering 110 degrees to an operational 90 degrees. The Clark compressors have a maximum design output of about 100 psig. The design criteria:

	Low Pressure Service	High Pressure Service
Suction Pressure (minimum)	0 psig	18 psig
Suction temperature	30 deg F	75 deg F
Discharge Pressure (minimum)	20 psig	70 psig
(maximum)	50 psig	100 psig

Hourly output varies with discharge pressure. At 20 psig discharge, 0 suction pressure, the compressors have a combined hourly output of 1.5 MMcf. At 50 psig, 0 suction, output is rated 1 MMcf. At maximum 100 psig, 18 lbs. suction capacity is about 1.3 MMcf/hr.

Station no. 6's output adds about 25 per cent to the capacity of Long Beach's previous 3-station system: Plant no. 1, in the harbor area, has three Ingersoll-Rand XVG-6 225 hp engines, their hourly capacity some 400,000 cf. Plant no. 4, near Long Beach's airport, has capacity of 2.5 MMcf/hr., boosted by three 550 hp HSRA-4 Clarks and two 400 hp HSRA-3's (the station became operative only in September, 1956). Third system station, plant no. 5 in North Long Beach, is rated 750,000 cf/hr. and is installed with four Clark engines (two 200 hp RA-2s and two 300 hp RA-3s).



But let's draw sharper focus on station no. 6, a compressor plant extraordinary: Essentially dual-purpose, station no. 6 receives natural gas purchased from Southern California Gas Co., via a 20 in. line at a maximum 148 psig. Incoming gas may be piped directly to a nearby major consumer (an electric utility's steam plant) which uses 125 psig gas. Or, gas may be regulated down to 20-30 psig, the Long Beach system's pressure, and piped into the distribution net (to any of three system stations). Or, incoming gas may be regulated, scrubbed and stored in the big 5 MMcf holder (from where, at a scant .5 psig, it's piped via a single 30 in. suction header to the operational sphere, boosted through the compressors to upwards of 30 psig, and routed to city of Long Beach distribution). Out of the compressors, gas is routed through either of two evaporative gas coolers (outlet temperature is 90 degrees F).





Wheel and hub design . . . suction sphere, which acts as suction header, seen here rising in center of circular doughnut discharge header. The feeding engines can be seen through the windows, background. Note Air Maze oil bath filters arranged around suction header and discharge header.



Control for all plant flow is centralized in the station's operations room, unique not only for its pushbutton supervisory control but for its graphically visual wall-wide system schematic. The console, with the help of four remotely located transmitter stations, can route gas through eight programmed piping complexes. Typical is the "holder to city system" program. An operator need merely follow the program's instructions—"open valve A", "close B", "close C", "open E", etc., to route gas from the plant's big holder, through the compressors, and to city distribution. Involved are a half dozen buttons. Pushed in proper sequence, they signal component controllers (usually pneumatical-ly). Compliance is confirmed both on the console

Principal Equipment Serving Long Beach Compressor Sta. No. 6

Gas engine compressors	Clark Bros.
Air compressor	Ingersoll-Rand
Intake air filters	Air Maze
Lube oil filters	Hilliard
Exhaust silencers	Maxim
Water pumps	Fairbanks-Morse
Fuel gas meter	Rockwell
Emergency diesel	Waukesha
Emergency generator	Fairbanks-Morse
Spark ignition	
(main compressors)	American Bosch
Supervisory control and console	Westinghouse
Lubricators	McCord
Pyrometer	Alnor

and on the systems schematic. Likewise signalled is any plant malfunction. For continuously, every valve and motor is monitored by remote controllers. "Process variables"—gas pressure, temperature and chemistry—are continually compared to the control setting of their respective controller or recorder. Should a signal exceed or fall below a predetermined limit, an electrical contact is activated, sounding a control room alarm and energizing warning lights both at the console and on the graphic systems schematic.

Each valve position on the console, for example, is monitored by four lights: green, red, white and amber. White indicates that the signal circuit is operative to the valve (or perhaps, to a motor).

Valve Position	Indicator Light
Open	green-steady
Closed	red-steady
Intermediate	amber-steady

The same kind of indicators signal the condition of various plant processes.

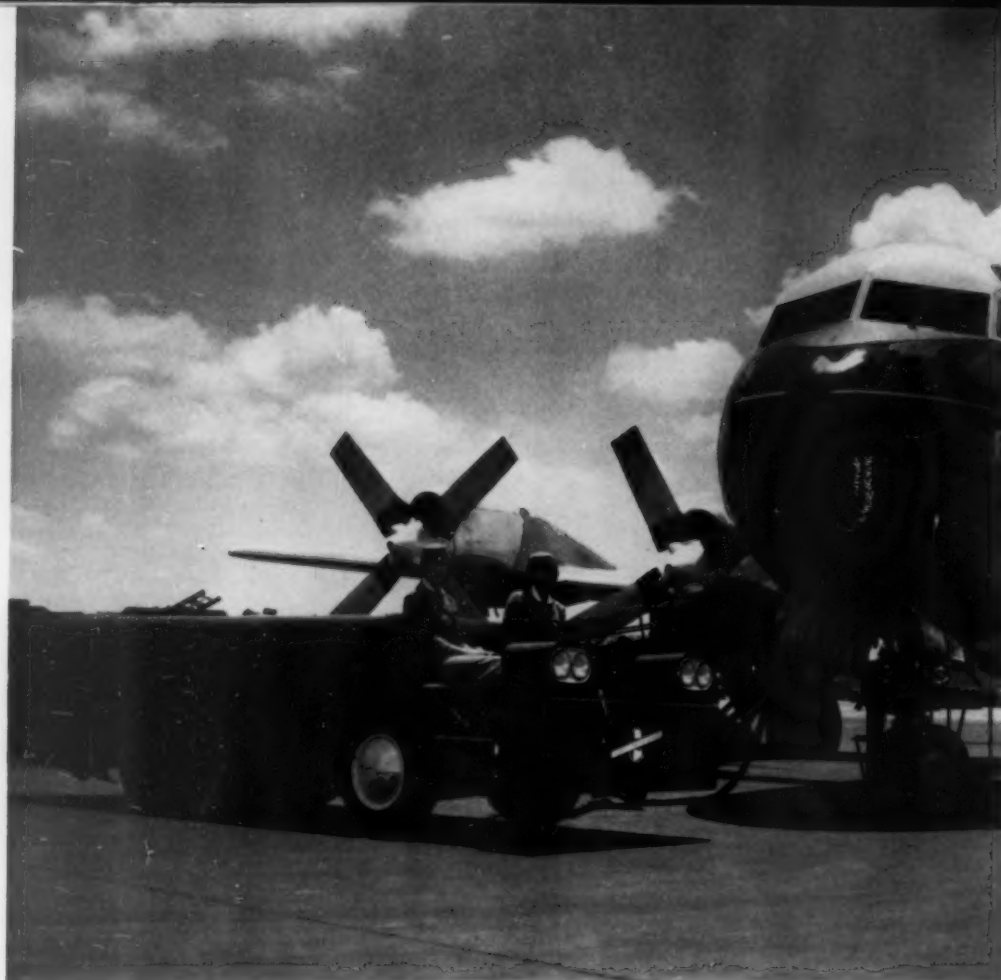
Process Condition	Indicator Light
Normal	green-steady
Abnormally high	Red-flashing, horn sounds

Acknowledge (confirms that signal reached component)	Red-steady, horn sounds
Abnormally low	Amber-flashing, horn sounds
Acknowledge	Amber-steady

Though station no. 6's flow is remotely monitored and as remotely controlled, compressor operation remains manual. Manually operated, for example, are lube oil cooler valves. So too, is valving for the jacket water cooler and the gas after-coolers. "But these particular components," explains one station operator, "aren't subject to constant change, as is gas flow." Also manual, is control of valves on the sphere-to-compressor and compressor-to-discharge header lines. Three valves for each engine-compressor are mounted on the compressor room floor. They control suction, bypass and discharge to and from compressors.

Station No. 6, compactly circular in design, is flanked by Wiggins holder, said to be largest dry-seal type holder ever built. It stands 174 ft. high, is 214 ft. in diameter.





GROUND SUPPORT UNITS SERVICE NEW AIRPLANES

**Low Slung, Mobile Vehicles Provide 400 Cycle Power
For Modern Jet, Turboprop Liners While on Field;
Maker Sees Applications in Other Areas**

STEWART & Stevenson Services, in Houston, Tex., is building a variety of diesel ground support units which it designed to service modern jet and turboprop airplanes now in use throughout the world. A low slung (48 in. overall height) mobile, self propelled power plant in the line has attracted particular attention among major airlines, aircraft manufacturers and military services. Moreover, according to the makers, unit features of precisely controlled power output, mobility and flexibility make them ideally suited for a number of other fields.

Ground support units are used to fill electrical requirements of planes on the ground. They supply power for air conditioning, fueling operations, instruments, galley stoves and similar equipment which must be operated even though the plane is not airborne. Except for the Viscount, Vanguard, Britannia and Caravelle aircraft, the ground support unit is not used to start the airplane engines. Other aircraft on which the units are currently being used include Boeing 707, Douglas DC-8, Lockheed Electra, Convair 880 and 600 and Comet IV.

The Stewart & Stevenson units are powered by GM model 6-71 and 4-71 diesel engines which burn either diesel fuel or JP-4 jet fuel. The engines, with bore and stroke of 4.25 x 5 in., drive specially designed compact generators built by Ideal Electric Co. A Woodward SG hydraulic governor is standard on both the 6-71 and 4-71 engines which turn the generators at 1846 rpm on all sets. Engine instruments and controls are conveniently grouped on a panel in the engine compartment.

Diesel engines were selected for the power supply because of their longer life, lower and less frequent maintenance requirements, lower operating cost and greatly increased reliability over gasoline engines of comparable output. Also, and very important, there is less fire hazard around the huge planes with diesel fuel. Operationwise, the diesel engines offer the advantages of better load performance compared with gasoline engines. Precise speed regulation required with 400 cycle operation with low transients as load changes can be better attained with the diesel units since there is less time lag in getting back to set speed.



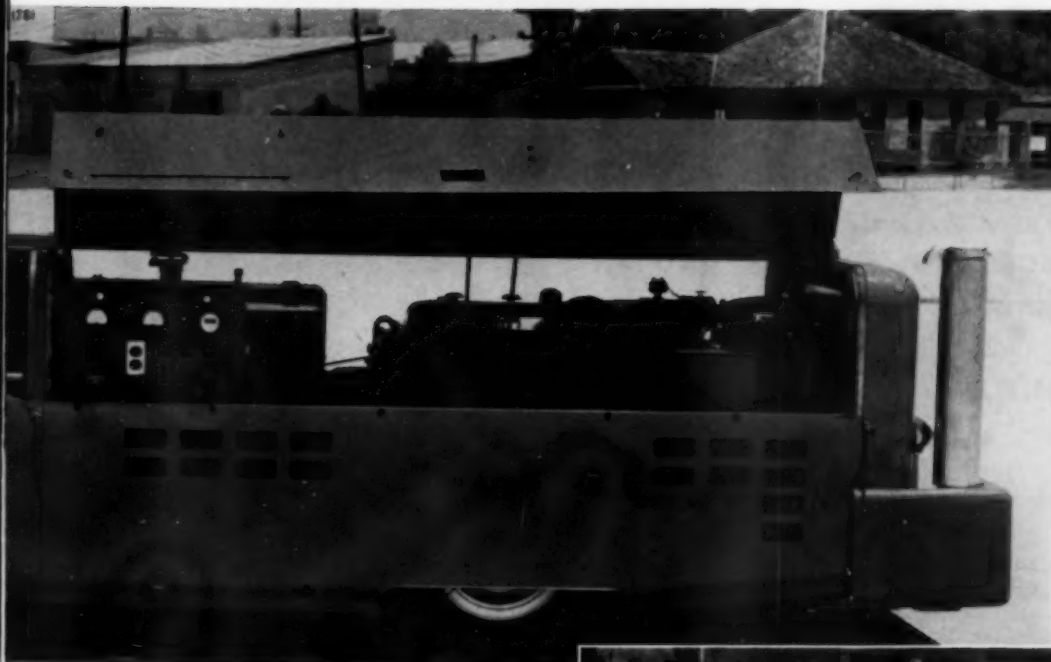
Stewart and Stevenson self propelled ground power unit serving a Braniff Electra at the Dallas, Texas airport. This vehicle is powered with a 6-71 GM diesel driving a 125 kva, 100 kw Ideal generator. Unfortunately, ground power units don't come equipped with drivers like these.

The synchronous generators, made by Ideal Electric Co., are 400 cycle at 1846 rpm, 3 phase, 120/208 volts, 80% p.f. with static excitation system. The generator is supplied with special mounting feet for upside down mounting and weighs only about 8 lbs. per kva. In addition to supporting itself the generator supports one end of the engine and also a GM automatic transmission at the opposite end. Electrical characteristics of the generator include the following:

Harmonic content, no load to full load	1%
Voltage modulation, no load to full load	0.1%
Voltage regulation	±1%
Voltage recovery, full load applied or removed	(sec.) 0.2
Operating range of rated voltage	10 to 15%
Supply short circuit current	300%
Line drop compensation	6%

The self propelled unit is driven by the engine through the generator shaft to a GM automatic transmission which drives the front wheels. Top speed for airport use is 15 mph. Stewart & Stevenson presented the ground support unit as the only generator set available that will service all three types of aircraft: pure jet, prop jet and piston type. One airline which has not yet started jet service already has ordered units which will be used for its present piston craft and will serve the new jet airliners when they arrive.

Looking more like some type of modern-age hot rod than a power plant, the trim mobile vehicles are highly maneuverable and can go anywhere an ordinary vehicle can go. Its 4 ft. overall height allows it to be driven close in to the aircraft being serviced. The units even come with auto-style tail fins if desired and a weatherproof cab is optional.



View, with the hood up, of the 100 kw vehicle powered with the 6-71 GM diesel. This type vehicle is used to service Electras and Boeing 707s. The unit provides 400 cycle ground power for all needs of the aircraft except starting. This compact completely self contained unit has a low silhouette to make it easy to get close to the aircraft being serviced. It has a speed of 15 mph.

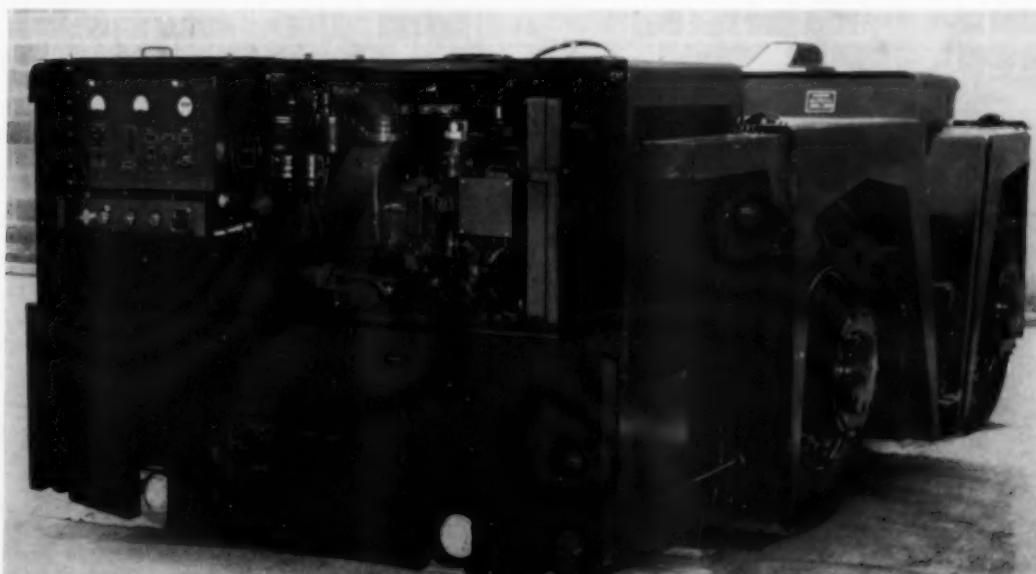
Self propelled units are being built in sizes ranging from 37.5 kva to 187.5 kva and are available as combination 400 cycle ac units and 28.5 v dc units. The firm also builds a variety of truck, tow tractor and trailer mounted support units in the 37.5-187.5 kva range. 28.5 v dc capacities range from 500 to 2500 amps.

But what started out as a service to the jet age promises to find a vastly wider application. Other fields in which Stewart & Stevenson plans to market the utility power model include missile and other military, law enforcement, firefighting, lumber and forestry services, construction, film companies for remote shooting locations, utilities, civil defense and disaster agencies, oil, pipeline, chemical and radio-TV stations for remote news coverage. From lower speeds necessary on airports, the power units can be geared up to normal highway speeds. For operation in rough terrain, larger wheels can be fitted. Emphasizing its flexibility,



Truck mounted Stewart and Stevenson precise power ground support generator set for use by Delta Airlines in servicing their Douglas DC-8 jet aircraft. A 4-71 GM diesel drives a 90 kva Ideal generator with control by a Woodward PSG isochronous governor.

Here is a 4-71 GM diesel 90 kva ground power unit mounted on the back of a Clark Towtractor for use by Delta Airlines. This unique unit illustrates the broad selection of ground power units available from Stewart and Stevenson.



the maker sees the mobile units as capable of powering water pumps and air compressors—thus providing hydraulic and air power as well as electrical—and electric welding machines and other accessories and machinery.

Airlines already using Stewart and Stevenson diesel ground support units include Braniff, International Airways, Continental, Delta and Trans-Canada. One Italian firm has purchased a quantity of the self-propelled units using the GM 4-71 diesel engines to service American, British, and French jet aircraft. Those units are rated 90 kva, 400 cycle, 2000 amps, 28.5 volts dc and 600 amps, 112 volts dc. Before the first unit was put into service the Houston builder had received orders for 50 more from three of the nation's largest airlines. And, say Stewart & Stevenson officials, interest being shown by other domestic lines indicates orders would double by the year's end. Inquiries from foreign lines also promise a substantial market in overseas areas.



Specially designed, compact generator made by Ideal Electric Co., for ground power units. Generator supports one end of engine and an automatic transmission. Power to the transmission is transmitted through the generator shaft.

INTERSTATE ROUTE 44 TAKES SHAPE IN MISSOURI

**Subsidiary Firm of Fred Weber, Inc., Employs
42 Unit Diesel Fleet to Construct
8.8 Mile Section of Highway
Near St. Louis**

By L. H. HOUCK



A 3 cu. yd. No. 3600 Manitowoc shovel, powered by a Cummins diesel engine, loads material to a 25 cu. yd. Euclid bottom dump, also powered by a Cummins engine. Equipment belongs to St. Louis County Bridge & Grading Co., a subsidiary of Fred Weber, Inc., St. Louis. Firm will excavate nearly 1½ million cu. yds. of rock and earth under \$3,374,543 contract.

ONE of the most important projects in the development of the Interstate highway system in Missouri is an 8.8-mile long section of Interstate Route 44 just west of St. Louis. It is to be opened for traffic soon. In keeping with the policy of the Missouri State Highway Department to do "first things first", the new limited access highway will provide needed relief from traffic congestion. In this area, heavy urban and metropolitan traffic is combined with heavy interstate coast-to-coast vehicles to make it a highly congested travel area.

New Interstate 44 is being built over much of the route of the present U.S. 66. In some sections, the existing route 66 will provide one of the roadways for Interstate 44. The divided Interstate high-

way will have 24-ft. wide divided portland cement concrete pavements located on rights-of-way ranging from 265 to 425 ft. wide, with even wider areas for interchanges. Two lanes of one-way travel feature long sight distances and reduction of accident exposure.

The 8.8-mile section includes five bridges—the longest is 267 ft. 6 in. long—10 culverts and three traffic interchange structures. The largest culvert is a double 10 x 6½ ft. concrete box 205 ft. long. The project includes 8.8 miles of 9 in. reinforced concrete paving and 5.4 miles of asphalt service roads with an 8 in. rock base, a 3 in. asphalt top.

Contract for this project, FAI-2 (I-44-4 (13)-260), located between Sylvan Beach and Times Beach

west of St. Louis, was awarded to St. Louis County Bridge & Grading Co., a subsidiary of Fred Weber, Inc., St. Louis, on Nov. 12, 1958, on its low bid of \$3,374,543. The new route, which cuts through the rolling hills of western St. Louis County, required 40 to 50 ft. cuts and fills, some of which were in hard rock. Total excavation was almost 1½ million cu. yds.—1,317,643 of dirt and 111,035 of rock.

Tough excavation problems made it necessary to throw in the heaviest diesel equipment available to move the material at profitable and economical speeds and quantities. Some of the material could be moved well with scrapers. Some of the "in-between" material, such as prehistoric cemented gravel chert, introduced abrasive and wear problems for rippers, scrapers and shovels. Two In-



One of three 24 cu. yd. Euclid TS-24 twin-diesel scrapers on the job heads for the dump area with a full load of material from a difficult location. Front engine is a GM 6-110; the rear engine is a GM 6-71.

A 25 cu. yd. Euclid 9LDT bottom dump makes a sharp turn at the bottom of a hill on the way to a dump area. The unit is equipped with a 275 hp Cummins diesel engine.



John Weber, general superintendent for St. Louis County Bridge & Grading Co., sits in his portable field office.



gersoll-Rand drills mounted on a Caterpillar D8 tractor were used to put down 2¾ in. diameter blast holes in the rock. The drills were supplied air from an Ingersoll-Rand Gyro-Flo 600 cfm compressor driven by a GM Diesel 6-71 engine. The blast holes were loaded with Atlas 40 per cent gelatin. The shot rock was loaded into a fleet of Euclid diesel dump trucks by a Manitowoc model 3600 shovel with 3½ cu. yd. dipper. This shovel is powered by a 6 cylinder Cummins diesel engine.

In addition to the 3600, the contractor had two other Manitowoc units on the job—a 25-ton crane with Cummins diesel for driving 50 ft. piles to 45 ft. depth and a 2½ cu. yd. shovel with Cummins diesel. This unit worked in the rock quarry. Included in the fleet of Euclid haulers were three 15 cu. yd. and six 25 cu. yd. bottom dumps and two 18 cu. yd. end dumps. All were equipped with Cummins diesel engines—200 hp for the 15 and 18 cu. yd. units and 275 hp for the 25 cu. yd. dumps. Some of the hauls ranged up to 12,000 ft. Cycle time was complicated because of the necessity to flag Route 66 traffic for crossings.

On the scraper dirt sections, Weber used a fleet that included six Euclid 17-yd. single engine (Cummins) scrapers; three 600 hp 24 cu. yd. Euclid twin engine units with a GM Diesel 6-110 engine in front and a GM Diesel 6-71 in the rear; three 8 cu. yd. LeTourneau-Westinghouse Tournapulls (GM Diesel 4-71's), and a Caterpillar 80 scraper pulled by a Caterpillar D8 tractor.

The pusher tractors, presenting an imposing array of diesels, included two new turbocharged Caterpillar D9's with Twin Disc torque converters, and an Allis-Chalmers HD-21 with Twin Disc torque converter. One of the D9's had a ripper

attachment. Other bulldozers included two turbocharged new Series H D8 Cats, four other D8's and an International TD-24. An Allis-Chalmers HD-21-G, a high lift loader with a ripper mounted on the rear, rounded out the tractor fleet. Cat grad-

Fred Weber, Inc., Equipment Spread

Units	Make & Type	HP	Engine Make
1	Manitowoc 3600 shovel	320	Cummins
1	Manitowoc 3550 shovel	300	Cummins
1	Manitowoc 25-ton crane	320	Cummins
6	Euclid 23TDT scrapers	275	Cummins
3	Euclid TS-24 scrapers	562	(2) GM Diesel
3	LeTourneau-Westinghouse Tournapulls	170	GM Diesel
1	Caterpillar D8-80 scraper	155	Caterpillar
2	Caterpillar D9 tractors	335	Caterpillar
4	Caterpillar Series H D8 tractors	235	Caterpillar
4	Caterpillar D8 tractors	155	Caterpillar
1	Allis-Chalmers HD-21 tractor	225	Allis-Chalmers
1	Allis-Chalmers HD-21-G tractor	225	Allis-Chalmers
3	Euclid 15 cu. yd. bottom dumps	200	Cummins
6	Euclid 25 cu. yd. bottom dumps	275	Cummins
2	Euclid 18 cu. yd. end dumps	200	Cummins
1	Ingersoll-Rand compressor	252	GM Diesel
2	Ingersoll-Rand drills on Cat D8	155	Caterpillar

ers used for fine grading and utility work were two No. 12's and a new turbocharged No. 14.

When the project was visited by DIESEL AND GAS ENGINE PROGRESS, grading and excavation was 75 per cent complete and the entire job was approximately 35 per cent complete. The contract included excavating, grading, bridges, sub-base and paving. St. Louis County Bridge & Grading Co. is a subsidiary of Fred Weber, Inc. Fred Weber, Sr., is president; Fred Weber, Jr., vice president; and John Weber, general superintendent. The Missouri Highway Department was represented on this project by R. A. Currie, district engineer, Kirkwood, Mo., and H. R. Kehrman, resident engineer.



THE CAT'S MEOW

Caterpillar Industrial Engine Division Begins Production of Three New High Speed Marine Diesels; Uses Florida Waters to Test Pair of 130 HP D320's in 28 Ft. Runabout

By ED DENNIS

THREE new lightweight, high speed marine diesels available either turbocharged or turbocharged and aftercooled have now been placed into production by the Industrial Engine Division of Caterpillar Tractor Co. Designed primarily for the small work boat and pleasure craft field, the 130 hp D320; the 180 hp D330 and the 270 hp D333 diesels reflect sound engineering and planning with a realistic look into the future of this market for the diesel engine industry. The engines

are compact with good weight to horsepower ratios, are ruggedly constructed and possess excellent operating characteristics. Each is factory dynamometer tested. Caterpillar with this new marine diesel engine line, ranging from 105 to 270 hp in four and six cylinders, is shooting for a good segment of marine power business formerly dominated by the gasoline engine. The D320's fit ideally in a Roamer 28 ft. steel runabout and this installation is described later in this article.

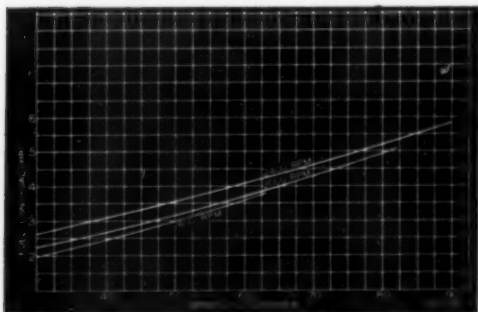
These new Caterpillar engines from a design standpoint are similar in many ways. Each is a four cycle, valve-in-head, precombustion diesel with a compression ratio of 18:1. The Caterpillar fuel system with individually mounted fuel pumps and single orifice nozzles is used and the pumps are gear driven from front with transfer pump driving off the same shaft with right angle bevel gear drive. To give the engines cleaner lines and reduce weight and size, the water and air intake manifolds

Running out at a top speed of 29 mph, the Cat powered *Meow* demonstrates her prowess during a trial run on Biscayne Bay. At the wheel is Steve Darlington, sales engineer of Shelley Tractor & Equipment Co.

The new model D320 Caterpillar marine diesel is rated 130 hp at 2400 rpm. Engine is equipped with AiResearch turbocharger and Capitol 1.2:1 r&r gear.

are an integral part of the cylinder head. The turbocharger manifold is divided with each manifold serving two or three cylinders depending on whether it is a four or six cylinder engine. Pistons for all three engines are of aluminum alloy, cam ground, and take three rings with a Ni-Resist top ring band. The heat plug has been eliminated and instead, piston cooling jets are provided in the cylinder block main bearing saddles. The after-cooler is applied to the engine for maximum performance and is mounted on the left hand side in front of the air cleaner.

Taking a look at the new marine engines individually, the D320 is a four cylinder diesel with a 4 x 5 in. bore and stroke and a displacement of 252 cu. in. At 2400 rpm it is rated 130 hp with turbocharger-aftercooler, and 105 hp without the aftercooler. The engine weighs 1300 lbs. without gear, has a cooling water capacity of 6 gals. and



Performance curve of the D320 engine to 90 hp, turbocharged only.

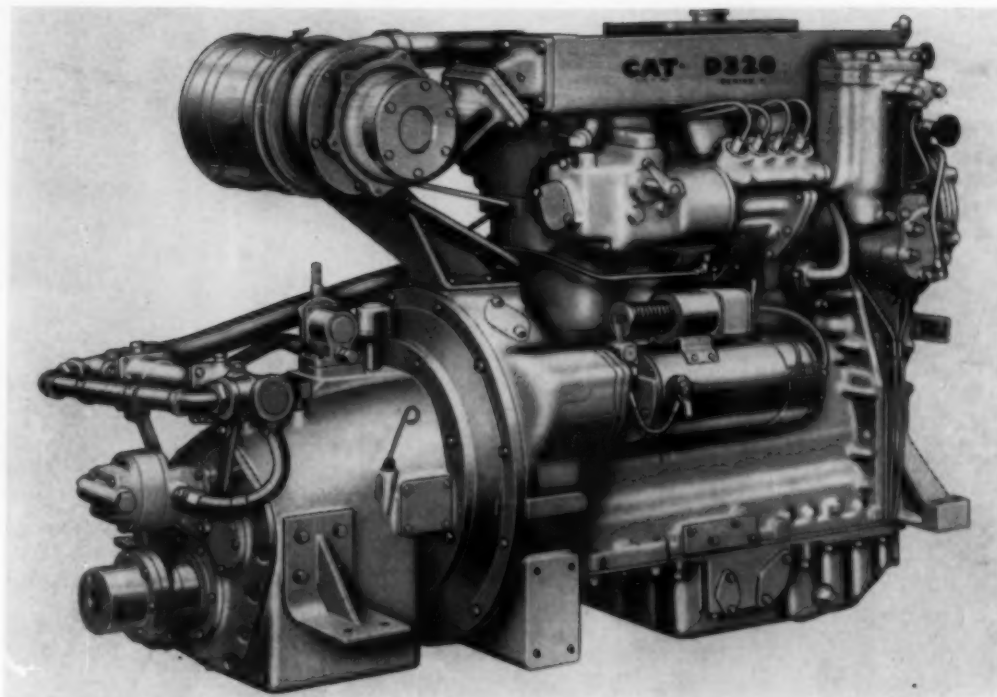
Turbocharged-Aftercooled		
	HP*	RPM
Maximum	130	2400
Intermittent	100	2400
Continuous	80	2000

*Based on 85° F. water to aftercooler

TURBOCHARGED		
	HP	RPM
Maximum	105	2400
Intermittent	90	2400
Continuous	70	2000

a crankcase capacity of 3½ gals. A five bearing crankshaft is used and steel backed aluminum bearings are employed. An AiResearch turbocharger has been used, and the engine is offered with either 2 HE-10,200 or 2 HE-10,700 Capitol gears.

The D330 has four cylinders of 4½ x 5½ in. bore and stroke and a cu. in. piston displacement of 350. It develops 180 hp at 2200 rpm with turbocharger and aftercooler, and 135 hp without the aftercooler. This engine without gear weighs 1640 lbs., has a cooling system capacity of 5½ gals., and a crankcase capacity of 4 gals. Caterpillar

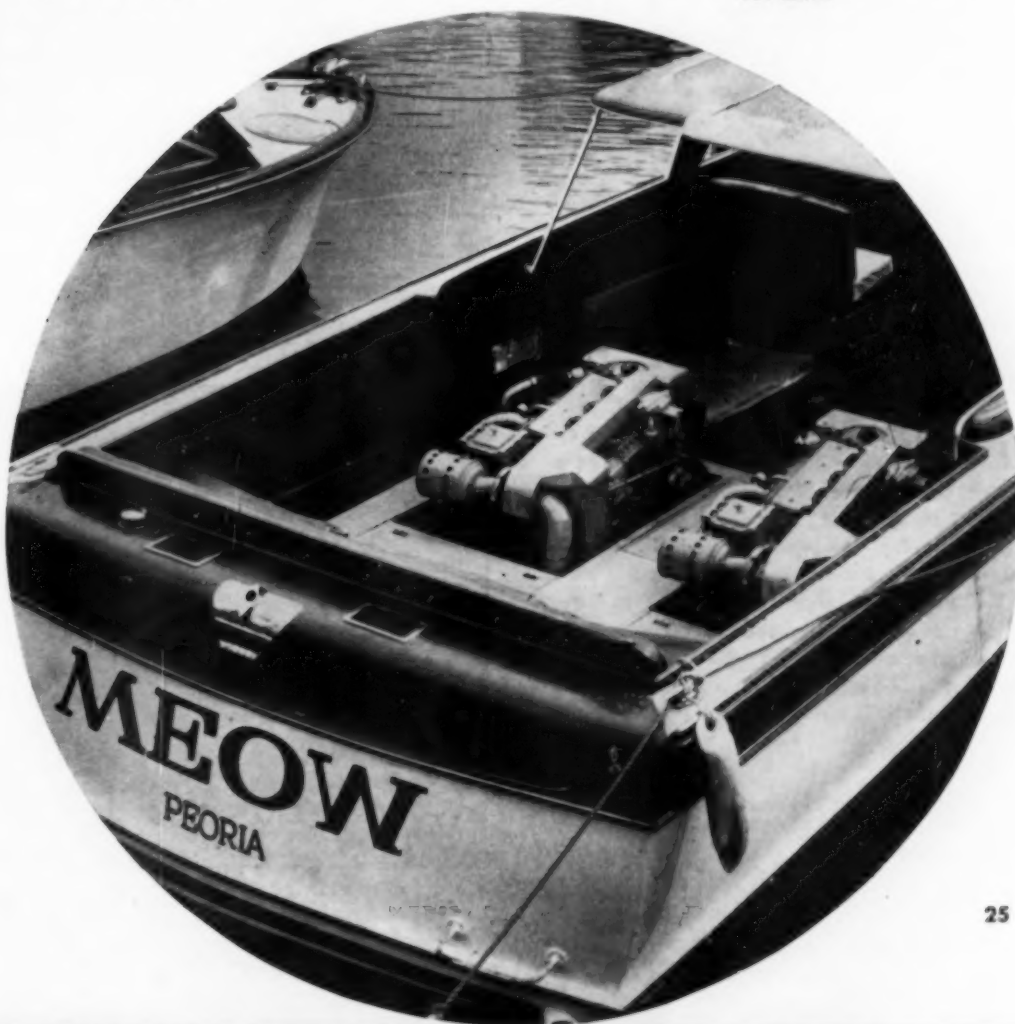


has used the Schwitzer turbocharger on the D330 and makes the engine available with the same gear combinations offered on the D320.

The D333, largest of the three, is a six-cylinder diesel with a 4½ x 5½ in. bore and stroke. Using a Schwitzer turbocharger, and an aftercooler, it develops 270 hp at 2200 rpm. It is rated 205 hp without aftercooler. The D333 takes a seven bearing crankshaft, but again employs steel backed aluminum bearings. It is offered with the Twin Disc MG-508 marine reverse reduction gear. It has a cooling system capacity of 6½ gals. and a crankcase capacity of 5½ gals.

Several starting systems are available for these three models—Delco-Remy electric motor; American Bosch Hydrotor hydraulic cranking motor; 15 hp Schwitzer vane-type motor for air starting; or an 18 hp gasoline engine starting motor. Included as standard equipment with the engines are: marine gear, turbocharger, dry type air cleaner, water cooled exhaust manifold, expansion tank, gear driven jacket water pump, 8 per cent hydraulic

Two D320's installed in the 28 ft. Roamer Sportsman. Engines turn 17 x 19 in. wheels. At an economical cruising speed of 24 mph, 90 gal. of fuel will give this cruiser a range of 180 miles.



assist governor, 1/2 engine speed tachometer drive, crankcase breather, instrument panel, fuel and oil pressure gauges, water temperature gauge, service meter, thermostats and housing, lifting eyes and engine mount supports.

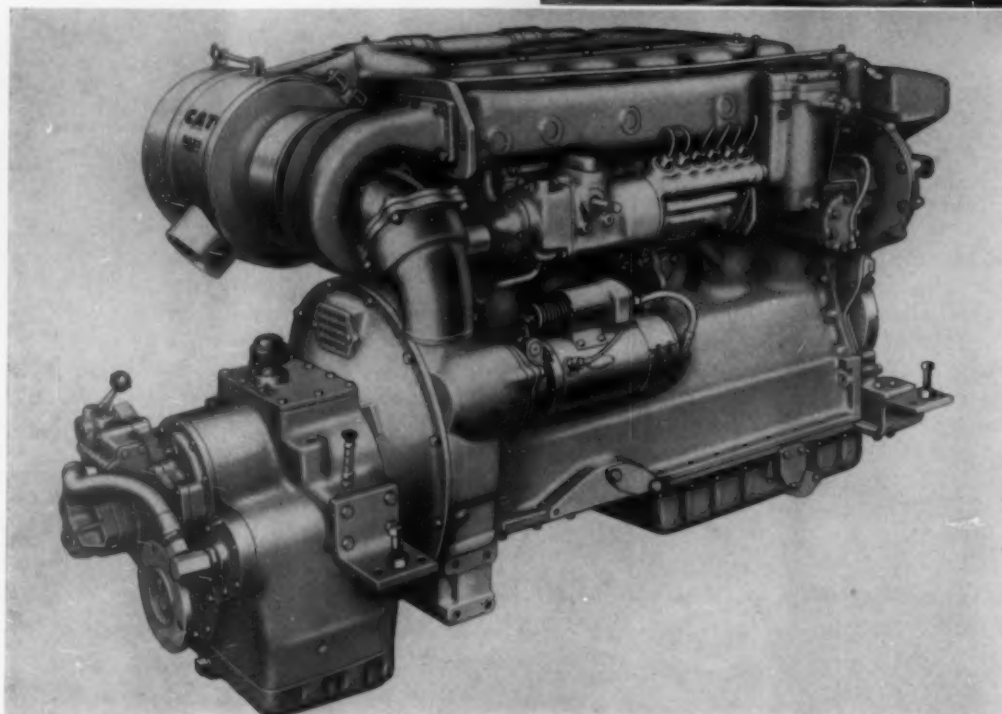
Here at Miami, Florida, I had the opportunity to view a pair of these new model D320, 130 hp, Caterpillar marine diesel engines under actual working conditions. The demonstration included speed runs and power tryouts in Caterpillars 28 ft. Roamer steel sportsman craft *Meow*.

Its performance was excellent, maneuvering in close quarters was above average. Running at 2400 rpm and developing a top speed of 29 mph, the craft made a complete 360 degree turn and the



↑
The *Meow* makes its run over the two mile measured course on Lake Peoria, Ill.

◀ Model D333 Caterpillar marine engine is rated 270 hp at 2200 rpm. View shows new Twin Disc MG-508 marine gear, Schwitzer turbocharger, Purolator dry type air filters.



Cats didn't drop a single rpm. There was only a slight increase in manifold pressure. At this speed there was no engine vibration and no objectionable after exhaust smoke or fuel oil smell on the stern and the four passengers conversed in normal tones. The engines purred like a pair of contented Cats dreaming of a saucer full of cream. Make no mistake: every foot of the *Meow* is sleek and cat quick in power and maneuverability on the water.

The *Meow* is all boat and the two small four cylinder 130 hp Caterpillar diesel engines will provide a cruising speed of 22 mph at 2000 rpm. On the 327 nautical mile trip from Jacksonville, Florida to Miami, with an average speed of 22 mph at 2000 rpm, lubricating oil consumption was about 3/4 of a quart per engine. Indications thus far on these test runs are that the engines can be operated at idle or trolling speeds for long periods without carboning or wash down of cylinder lubricating oils by unburned fuel.

Dimension of the new 130 hp Caterpillar marine diesel. ▶

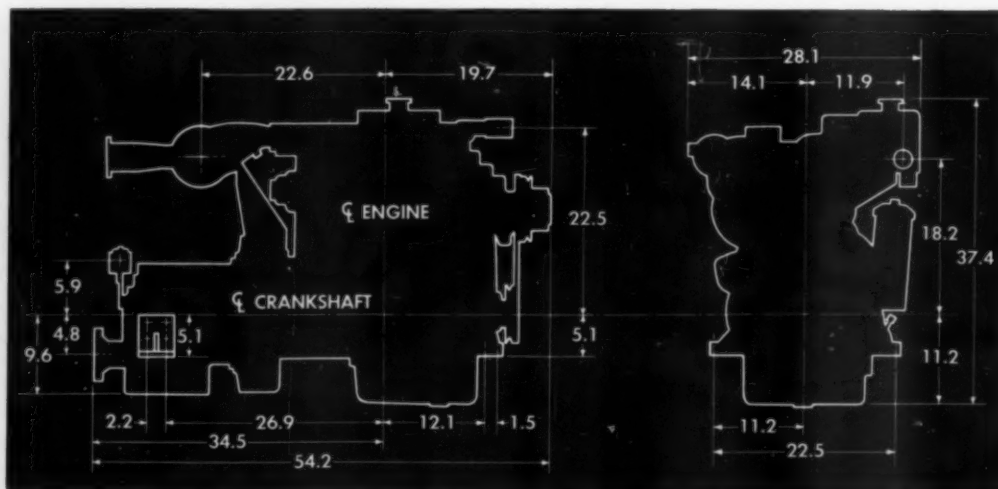
These two D320 Cat diesels are the first production line of this new series and have, at this time, 325 carefree hours on them. They have a piston displacement of 252 cu. in. and a compression ratio of 18:1.

Here is some additional engineering information on this dieselized craft gathered on the U.S.

Engineers two mile course on Lake Peoria, Ill. with the *Meow* loaded:

Engine rpm:	Speed:	Fuel Consumption 2 Engines	Cruising Range on 90 Gals.
1800	18.3 mph	8.6 gph	192 miles
2000	22 mph	11 gph	180 miles
2400	28.1 mph	17 gph	148 miles

The *Meow* was built by the Roamer Steel Boat Co. a division of the Chris Craft Corp. It measures 28 ft. by 10 ft. and draws 2 ft. 8 in. of water. It is a utility cruiser with a modified "V", 11 gauge, steel hull having a gross weight with full fuel oil tanks of 11,900 lbs., the fuel capacity is 96 gals. The two diesel engines drive two Columbian three blade 17x19 propellers through Capitol 2HE-10,200 1.2:1 hydraulic reduction gears. Installation, on the *Meow*, also included Young heat exchangers and AiResearch turbocharger. These are two "cats" that really take to the water in a big way.



SELF-POWERED TENDERS SIMPLIFY DREDGING OPERATIONS



New dredge tender of the Pacific Dredging Co., is powered with a 220 hp diesel Harbor-master marine tractor.

IN dredging operations, laying discharge lines and anchors and meeting tight schedule requirements no matter what the adversity of conditions, is no job for soft men or soft equipment. Pacific Dredging Co., Paramount, Calif., one of the largest dredging companies on the west coast, has pioneered use of self-propelled barges to efficiently handle their anchors and discharge lines, and to complete their jobs on schedule. Just recently they added another of these dredge tenders to their modern fleet. This latest barge incorporates a combination of equipment which gives positive control with a high safety factor. It allows crews to handle anchors and discharge lines swiftly and surely and enables them to perform a variety of other operations more efficiently.

The new steel barge is 60 ft. long and 26 ft. wide. Main propulsion and direct thrust steering is supplied by a Murray & Tregurtha model OA61P Harbor-master marine tractor powered by a GM 6-110 diesel engine rated at 220 hp continuous. It swings a 60 in. x 48 in. propeller at 308 rpm. The Harbor-master has hydraulic power steering and power elevation of the outboard drive assembly which allows shallow water operation and ease of access for servicing the unit.

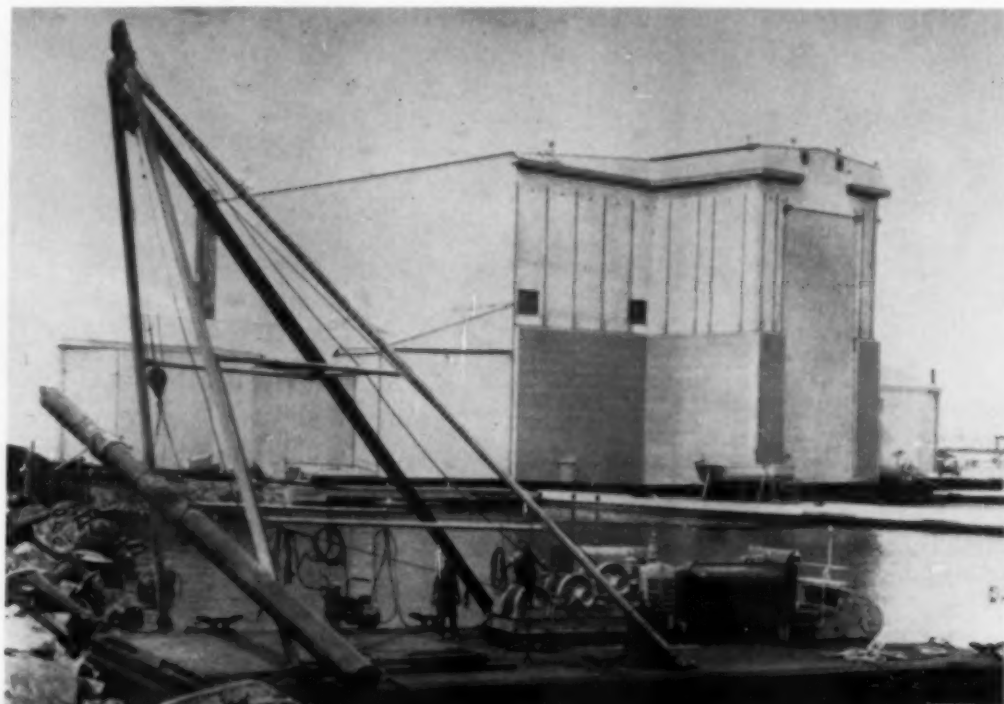
Although the main purpose of the dredge tender is to position and recover dredge anchors, it is

also used extensively to position and maintain the discharge line system carrying dredge slurry. With direct thrust steering, positioning of the barge is done in a minimum of time. The barge is equipped for welding and other operations, so line sections and dredge components can be serviced and put back in production rapidly, allowing considerably higher average removal of mud per day than was previously experienced.

This self-powered barge gives exceptional maneuverability in transporting supplies and personnel,

and as a general work boat. The high thrust from the Harbor-master is also mighty important. When extra power is required to quickly move the dredge, Harbor-master can supply it. There is a substantial saving in direct operating man-hours, and it is estimated that dredging operations show an overall saving of up to 70 per cent over use of a conventional tug and barge combination. Considering the large investment involved in a big dredge operation, any increase in dredge production time quickly shows up as a major reduction in the overall cost of a job.

One of Pacific Dredging Co.'s dredge tenders underway. Harbor-master marine tractor is equipped with a GM 6-110 diesel engine.



THIBODAUX CUTS COSTS WITH NEW 6000 HP PLANT

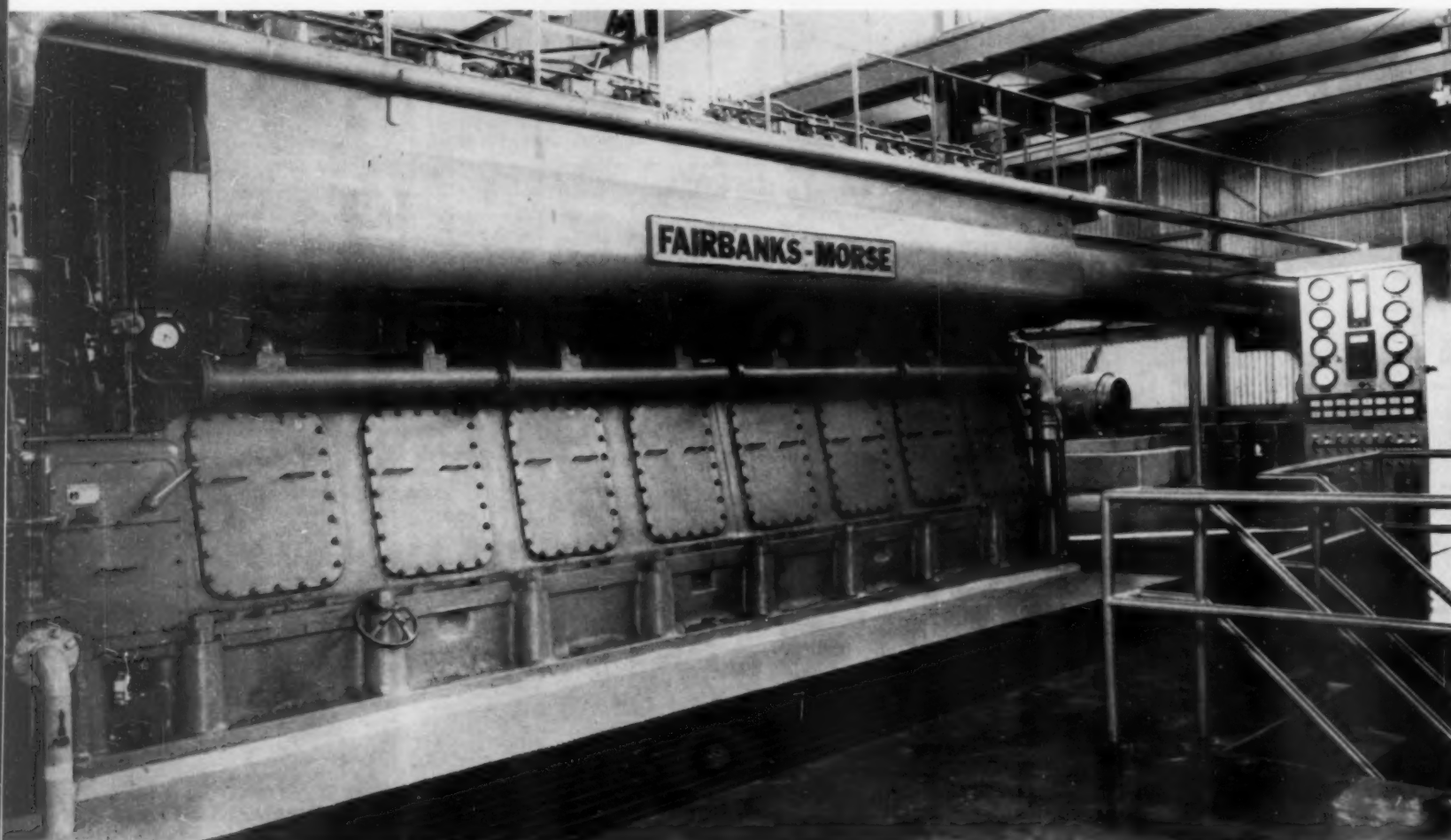
**Louisiana Town Starts Second 60 Years of Power Generation
With Three New 2800 HP Fairbanks-Morse Dual-
Fuel Engines on the Line; 43% Savings
in Fuel Costs Reported**

THIBODAUX, Louisiana, in 1958 started its second 60 years of municipal power generation. It put into fulltime operation an all-new plant, powered by three 2800 hp Fairbanks-Morse 2-cycle dual-fuel engines. On the basis of the first year's performance, a reduction in fuel costs of 2.53 mills per kwh was achieved. With the three engines generating a total of 19,522,000 kwhs during 1958, the 43 per cent cut in gas and fuel oil costs represents a saving of \$49,390.66 to the municipal utilities system. Lower operating costs were expected but were not the sole reason for Thibodaux's construction of a new power plant and abandonment of the old. Of the five 4-cycle dual-fuel units in the old plant, three had been converted in the field. Although the newest unit had

been installed after World War II, in 1949, the oldest unit dated back to 1917 and World War I. In 1955, with the electric load rapidly approaching the plant's capacity of 2945 kw, the consulting engineering firm of Barnard and Burk of Baton Rouge, La., surveyed the plant. It found no room in the existing plant for additional horsepower; further, the building of an addition did not seem desirable. The plant had grown where it had started, in the heart of the town. An addition could be built only at the sacrifice of park grounds. The consultants recommended construction of a complete new power plant on the outskirts of the town and the abandonment of the old plant, except for possible future peaking service. A contract was awarded to Fairbanks, Morse & Co.

for three 8 cylinder, 2 cycle 18 x 27 in., 2800 hp., 2000 kw, model 31AD18 dual-fuel engines operating at 277 rpm. The imposing, efficient plant, designed by the consulting engineers with the generating units, switchboard and battery room on the main floor and all auxiliary units in the basement, was completed and engines on the line by July 1957. Acceptance tests conducted by Barnard and Burk between March 25 and April 1, 1958, showed that fuel consumption of all three engines was well within the limits of the manufacturer's guarantee. The range for total fuel consumption was from 0.9 under the guarantee at full load to 12.2 under at half load. Gas consumption ranged from 0.6 under the guarantee at full load to 10.1 under the guarantee at half load; pilot oil consumption from 5.7

One of Thibodaux's three new Fairbanks-Morse model 31AD18 dual-fuel engines. Note electric gauge board at right, incorporating Alnor pyrometer.



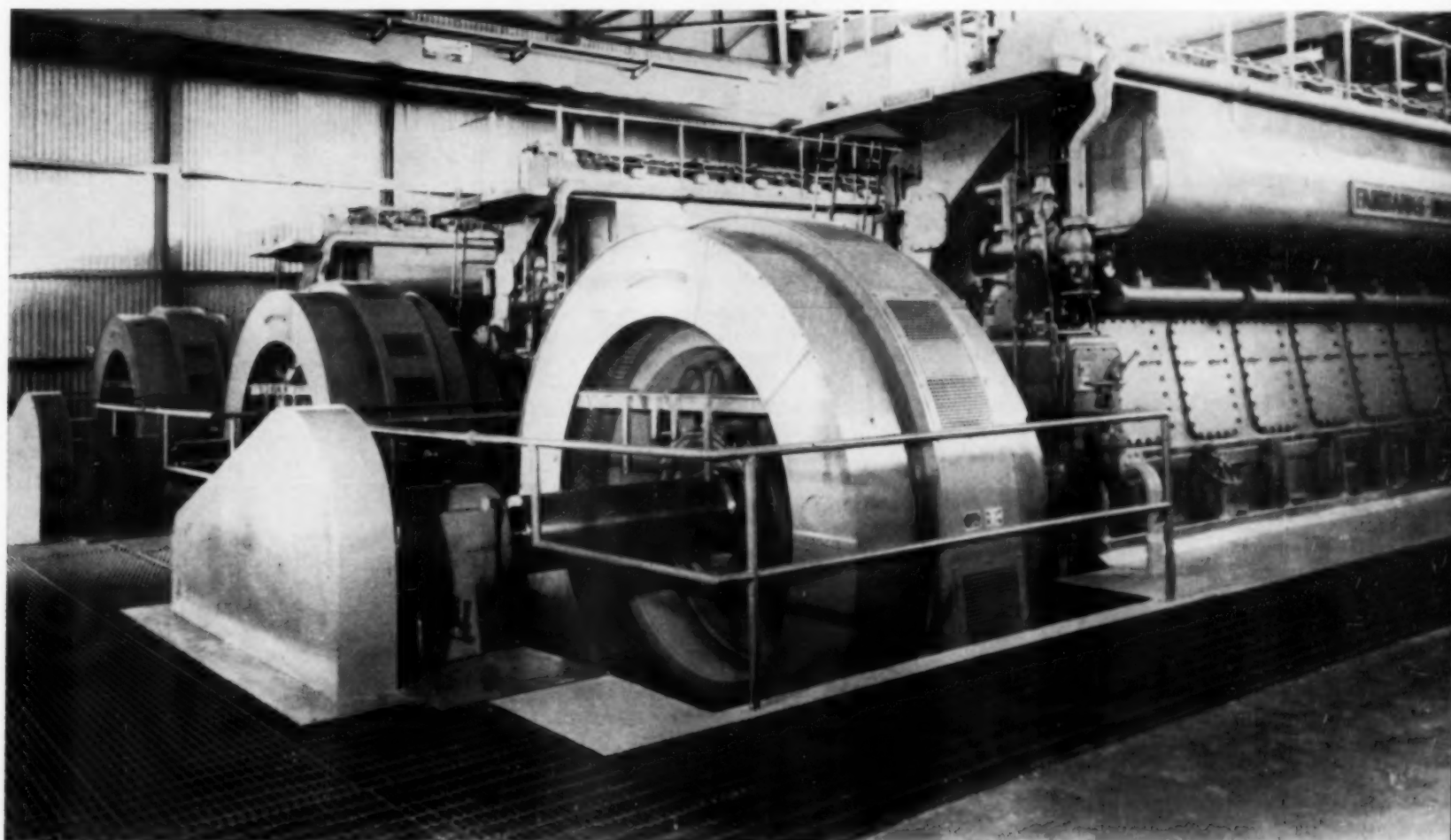
under the guarantee at full load to 32.3 under at half load. The effect of the new engines was swiftly apparent in improved power generating efficiency and economy. In 1958, the first full year during which the new plant carried the entire electric load, the three dual-fuel units ran a combined total of 16,280 hours and produced 19,522,000 kwhs. Gas consumption for the entire plant was 213,134,000 cu. ft., an average of 10.917 cu. ft. per kwh; pilot oil consumption was 136,134 gal., an average of .0069 per kwh. This compares with an average of 12.06 cu. ft. of gas and .0268 gal. of pilot oil per kwh for the old plant during 1956 when 10,336,300 kwhs were generated. This sharp improvement in fuel consumption was achieved with the new engines operating at an average load factor of 60.03 per cent.

Performance figures for 1958 show that all three of the engines ran approximately the same number of hours at the same average load factor with nearly the same fuel efficiency. Engine No. 1 ran 5455 hrs.

Thibodaux Utility Growth				
Year	Gross Sales Water & Light	Kilowatt Hrs. Sold	Operating Profits	Transferred To General Fund
1958	\$599,861	15,176,681	\$342,115	\$114,100
1957	600,633	14,560,000	339,185	209,500
1956	499,299	13,531,500	270,489	100,000
1955	457,355	10,336,300	210,770	135,000
1954	430,298	10,392,050	189,075	135,000
1953	372,953	9,585,305	197,730	90,000
1952	347,957	8,832,300	138,642	90,000
1951	328,267	7,970,013	164,843	55,000
1950	289,890	7,921,360	148,820	70,000

and produced 6,377,000 kwhs at an average gas consumption of 11.070 cu. ft. per kwh and pilot oil consumption of .00688 gal. per kwh. The No. 2 engine, the plant's top producer, ran 5811 hrs. and compiled 6,759,000 kwhs. It consumed an average of 10.728 cu. ft. of gas per kwh and .0070 gal. of pilot oil per kwh. Engine No. 3 ran for 5014

hrs., produced 6,386,000 kwhs and averaged 10.964 cu. ft. of gas and .00699 gal. of pilot oil per kwh. Figuring the fuel costs of both the old and new plant on the basis of 22 cents per thousand cu. ft. for gas and 11.5 cents per gal. for pilot oil, the improved efficiency of the three new engines is saving Thibodaux 43 per cent on fuel. In 1956,



All three Fairbanks-Morse units are shown on the line. These 8-cylinder, 2 cycle, 18 x 27 in., 2800 hp, 2000 kw units operate at 277 rpm.

Thibodaux Plant Operation—1958

	Engine No. 1	Engine No. 2	Engine No. 3	Total Plant
Engine hours operated	5455	5811	5014	16,280
Kilowatt hours generated	6,377,000	6,759,000	6,386,000	19,522,000
Gallons fuel oil used	43,877	47,793	44,683	136,353
Cubic feet gas used	70,599,000	72,515,000	70,020,000	213,134,000
Gallons lube oil used	5432	5787	4993	16,212
Load factor	58.4%	58.1%	63.6%	60.03%

the last full year for the old plant, gas cost 2.65 mills and oil 3.08 mills for a plant average fuel cost of 5.73 mills per kwh. The new engines in 1958 averaged 2.401 mills for gas and .802 for pilot oil for a total fuel cost of 3.205 mills per kwh. This 2.53 mill per kwh savings, added up to a total for the year of \$49,390.66.

With this considerable savings in fuel and with the increased capacity, backed up by the old plant for

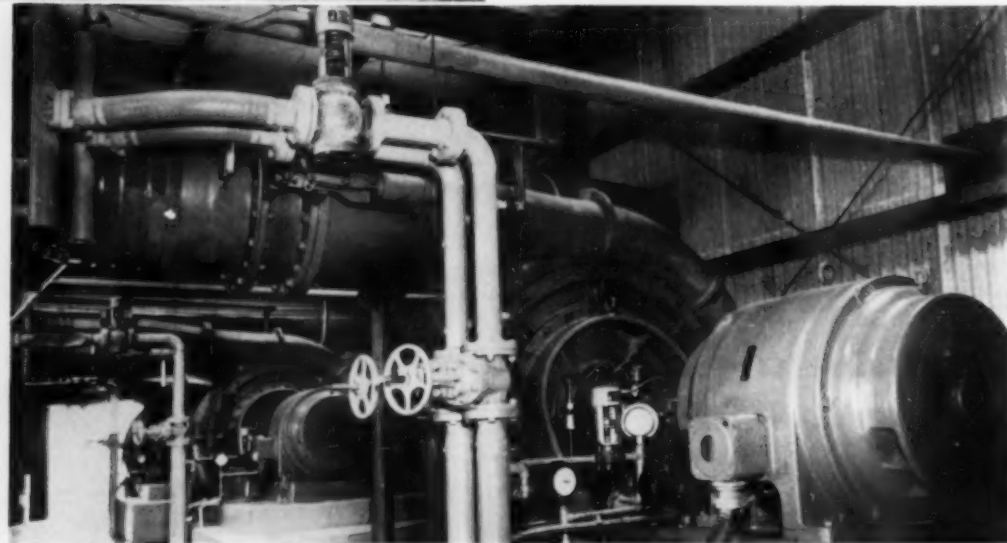


Thibodaux's new power plant is located at the outskirts of town. ➡

Roots-Connersville scavenging air blowers are driven by 250 hp Fairbanks-Morse motors. Note Fulton Sylphon temperature control valve. ➡

future peaking service, the town anticipates additional benefits from its electric service. The Thibodaux utility system always has been a profitable enterprise. In the nine year period, from 1950 through 1958, the Water and Light Department transferred a total of nearly 1 million dollars to the general fund. In addition, the town is provided with so-called free services at an estimated yearly value of \$27,800. Included are street lighting and the light and power for sewage pumping, drainage pumping, the library, the recreational centers and the town swimming pool. Power plant employees maintain these facilities without charge. The town's present tax rate is 26 mills on an assessed valuation of \$5,516,539. In 1958, \$114,100 was transferred to the general fund (slightly less than in 1957 because of new plant costs) and \$27,800 contributed in free services, a total of \$141,900. To raise this sum by taxes the town would have had to double its present rate from 26 to 52 mills.

The generation of its own power has always been a plus factor to Thibodaux. Located approximately 59 miles southwest of New Orleans, La., it is named after Henry Schuyler Thibodaux, a native



of Albany, N.Y., though many of the original settlers were the Arcadians whose expulsion from Nova Scotia was made famous in Longfellow's poem "Evangeline". Thibodaux's power facilities have been built up from the original small steam-driven generating unit installed in 1898 to the present new 6000 kw capacity without burden to the taxpayers and without outside aid. It has been the other way around. During the depression the plant largely supported the other municipal services and, as has been mentioned, its yearly contributions of cash to the general fund and of services to the town have exceeded \$100,000 for the last nine years. Important to the healthy growth of Thibodaux's utilities have been the untiring efforts

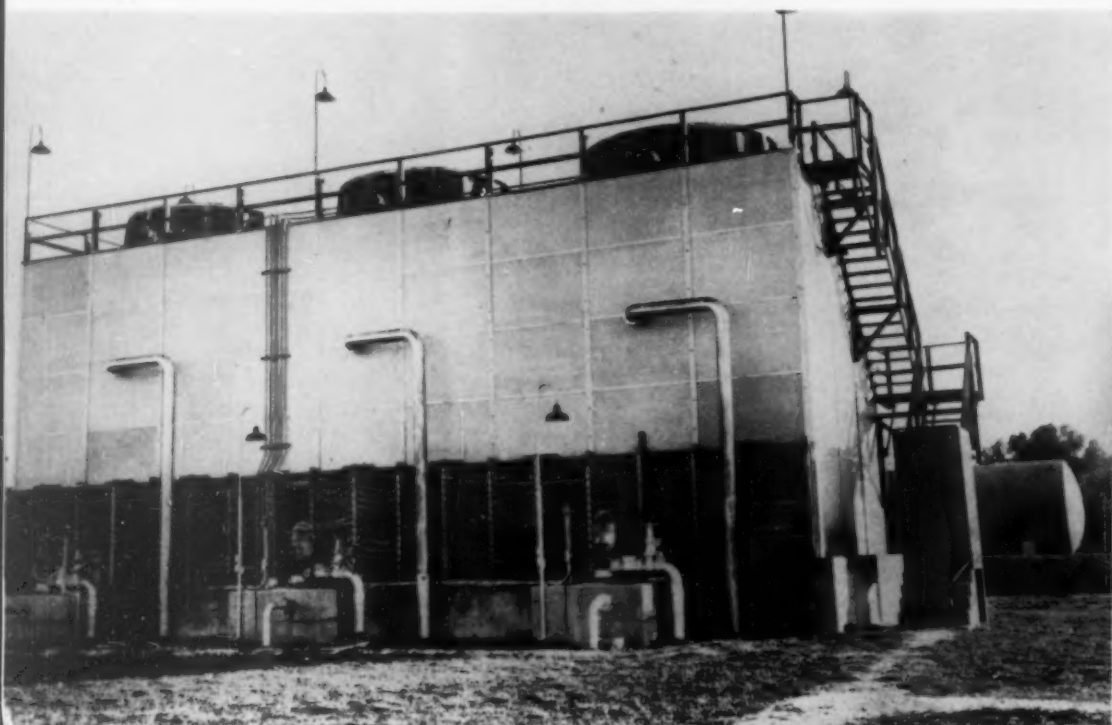
of Mayor Leonard J. Toups; Mr. Bertrand Hebert, trustee of public property; Mr. Kenneth Hoffman, trustee of finance; Mr. Nelson Zernott, city clerk.

Principal Equipment Serving Fairbanks-Morse Engines

Engines	Fairbanks-Morse
Generators	Fairbanks-Morse
Standby lube oil pumps	De Laval
Lube oil strainers	Elliott
Lube oil filters	CFC Fullflo
Standby fuel oil pumps	Fairbanks-Morse
Scavenging air blowers	Roots

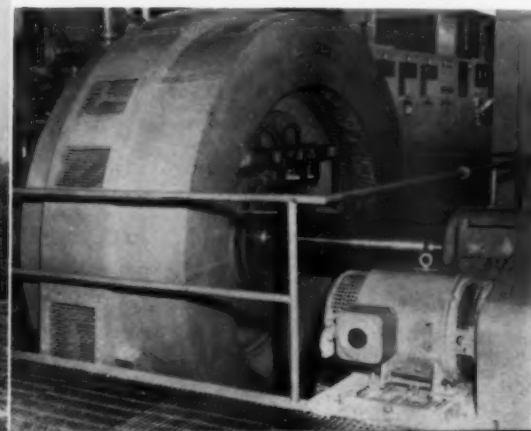
Air blower motors	Fairbanks-Morse
Circulating water pumps	Fairbanks-Morse
Cooling tower	Pritchard
Heat exchangers	Ross
Oil coolers	Ross
Exhaust & intake silencers	Burgess-Manning
Air intake filter	American
Exhaust expansion joints	Flexonics
Switchboard	General Electric
Gauge Boards	Ponca Electric
Temperature control valves	Fulton Sylphon
Alarm switches	
.....	Mercoide - Minneapolis-Honeywell
Pyrometers	Alnor
Batteries	Exide

30



➡ This three-unit Pritchard cooling tower serves the three F-M engines.

➡ All three Fairbanks-Morse generators are equipped with a belt driven 24 kw exciter.



SOUND FUTURE FOR THE WATERWAYS

Here Is a Special Report by Braxton B. Carr, President of The American Waterways Operators, Inc. Which Projects Firm Growth of Industry: Carrier Fleet Now Made Up of 15,221 Cargo Vessels and 4,169 Diesel Tugs and Towboats

WITH the Mississippi Valley Association meeting in St. Louis this month, certainly it is an appropriate time to look at the current level of activity in the barge and towing industry and anticipate what 1960 and years to follow will be like in terms of business and technological advances. One man well qualified to present this review and outlook is Braxton B. Carr, president of The American Waterways Operators, Inc. His report for 1960 as prepared especially for DIESEL AND GAS ENGINE PROGRESS states:

"The Nation's shallow-draft water carrier industry in 1959 went through its second successive lean year of business and is anticipating another in 1960. This prediction is based on a study of unofficial statistics compiled by the Army Corps of Engineers which indicate the volume of traffic last year equalled that of 1958. During both of these years shallow-draft water carrier operations fell below the record set in 1957 when the industry hauled 392 million tons of commerce and provided 115 billion ton-miles of service over 29,000 miles of navigable inland waterways. Incomplete and unofficial figures place the 1958 volume of inland waterway traffic at 366.5 million tons hauled and 109.1 billion ton-miles of service.

Early last year chances looked good for the barge and towing vessel industry to register a comeback as the volume of traffic started strong and continued to gain generally on all waterways for the

first six months. However, the level of traffic was interrupted during the last half of 1959 by the steel and dock strikes and by labor disputes in the industry itself. Despite this two-year decline in inland water carrier traffic, long-range prospects for the industry's growth are good. Since the Second World War inland water carriers have increased their share in total transportation so that they now provide more than eight per cent of all intercity ton miles of service. In 1945 inland water carriers were providing only three per cent of the total. Carrying this current volume of traffic is a modern inland water carrier fleet made up of 15,221 cargo vessels with a hauling capacity of 13.8 million net tons and 4,169 diesel towboats and tugboats which have a combined horsepower of 2.3 million units. This fleet, which excludes those on the Great Lakes, includes 12,912 dry cargo barges with a capacity of 10.4 million net tons and 2,309 liquid cargo barges and shallow-draft tankers with 3.4 million net tons capacity.

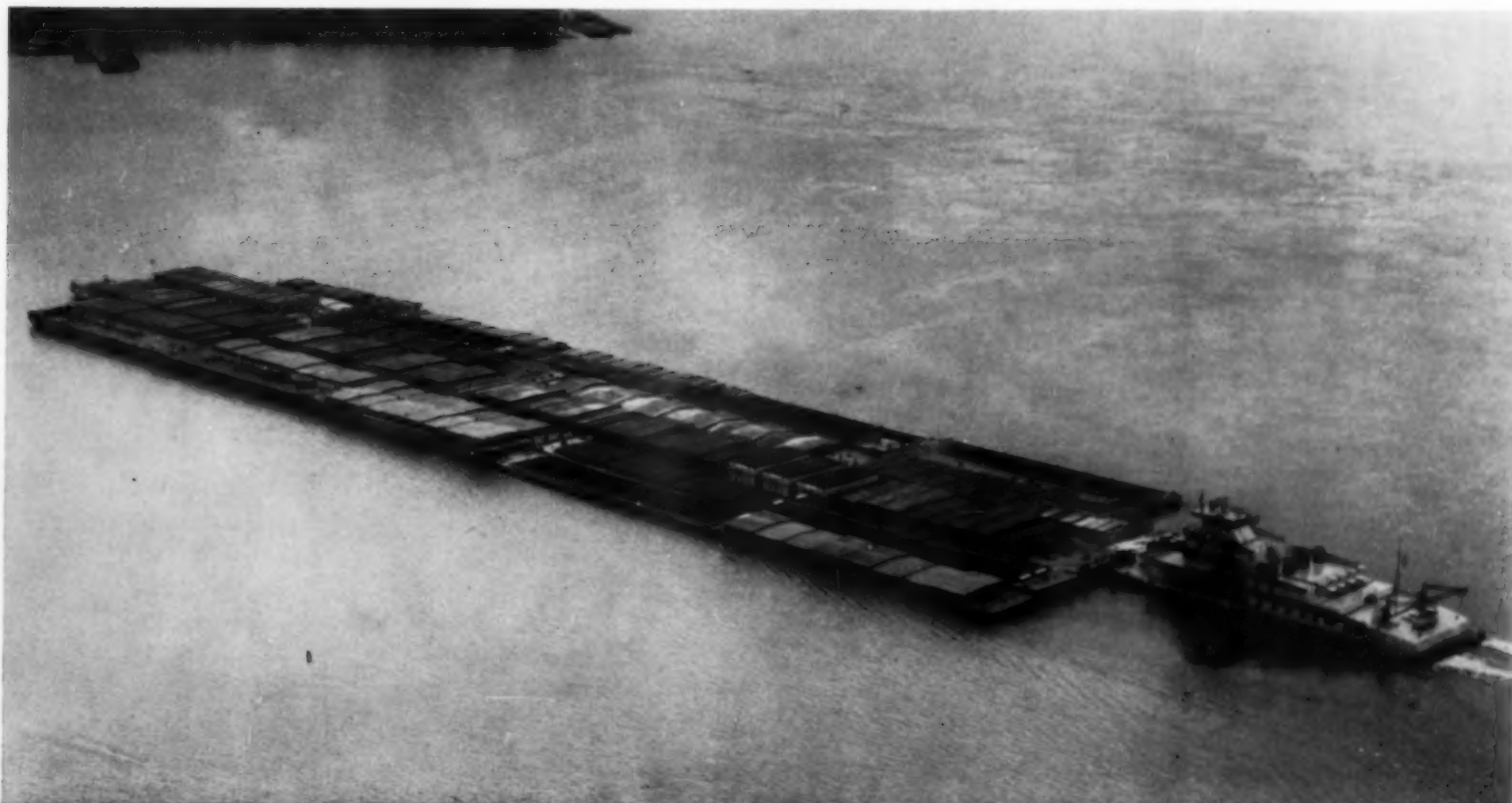
Larger Boats and Barges

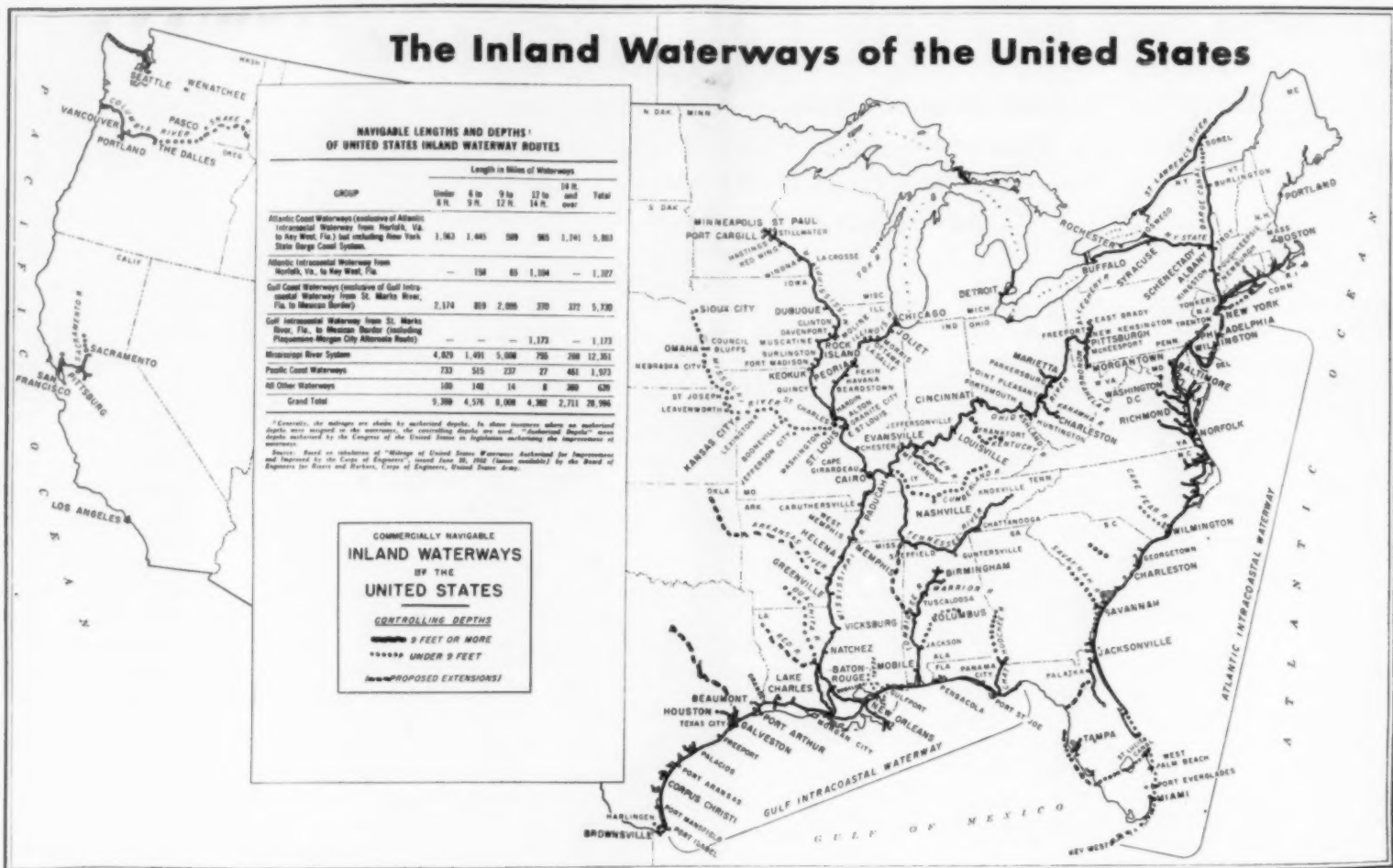
The latest figures from the Corps of Engineers show that the trend is toward the construction of more powerful towboats and larger barges. The Mississippi River System and the Gulf Intracoastal Waterway, according to the latest statistics from the Corps, have fewer but by far more powerful diesel towboats than the other three systems combined. On these two systems there are nearly

1,900 towboats and tugboats which have a combined horsepower of 1.3 million units compared with the remaining 2,317 towing vessels capable of generating 1.1 million units of horsepower in service on the Atlantic, Pacific Coast waterways and in the Gulf of Mexico. In anticipation of expected future growth, the industry is currently proceeding with plans to expand its fleet of cargo vessels. Old vessels are being replaced with newer and more efficient models at such a rate that there is usually a net increase in the size of the fleet each year. By the end of 1960 the inland fleet can reasonably be expected to total 13,905 dry cargo barges and scows with a combined capacity of 11.9 million net tons, and approximately 2,500 tank barges with a total cargo capacity of nearly 4 million net tons. In order to move the cargo vessels in this expanding fleet, an estimated 4,334 diesel towing vessels with a total of 2,672,089 horsepower, will be needed by the end of 1960.

By 1962 the inland waterway fleet is expected to be made up of 4,447 towing vessels with a total of 2,945,978 horsepower, 14,609 dry cargo barges and scows with a total cargo capacity in excess of 12,959,714 net tons, and 2,664 tank barges with a total cargo capacity of 4,162,340 net tons. This would give the nation a combined cargo carrying capacity in dry cargo and tank barges of 17,122,054 net tons. By 1967 projections indicate that there will be 4,673 towboats in service with a combined horsepower of 3,671,225 units. They will be

Federal Barge Lines 180 ft. M/V *United States* powered by four Cooper-Bessemer diesels developing a total of 8500 hp on the Upper Mississippi River with 42 barges carrying 30,661 tons in tow. A sister vessel, essentially a duplicate of the *United States* will be built by St. Louis Shipbuilding & Steel Co. in 1960 for Federal Barge. Its total rated horsepower will be 9000 with four Cooper-Bessemer engines supplying the power.



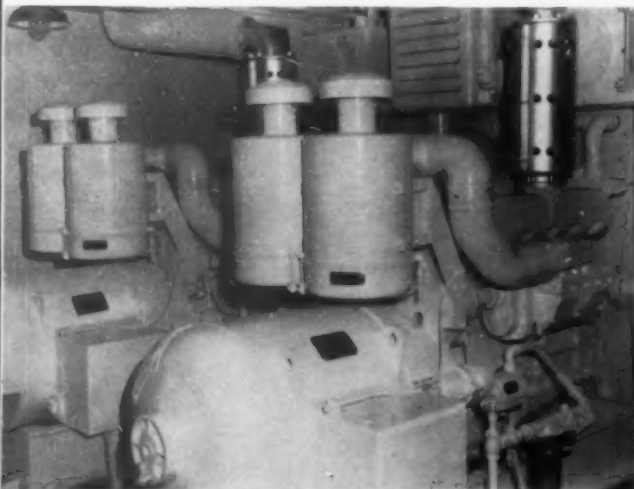


propelling approximately 16,129 dry cargo barges and scows with a cargo capacity of 15,767,474 net tons and 2,999 tank barges with a capacity in excess of five million net tons, or a total of 19,128 cargo-carrying vessels providing a total combined capacity of 20,783,090 net tons.

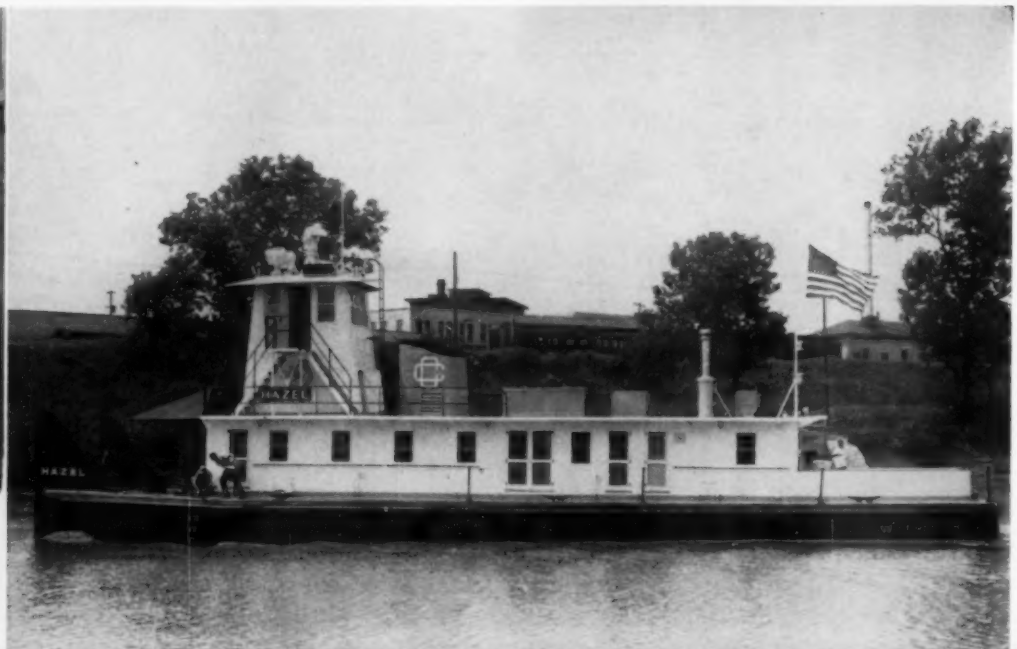
One of the strongest signs that points to a continued high level of activity in the industry is the large number of industries located on navigable rivers and canals which are currently developing and constructing barge loading and unloading facilities. This accelerated construction of barge-

handling docks and terminals started in the first quarter of 1959 and has maintained a steady pace through the third quarter. The result has been that over this nine-month period 117 barge docks have been put in place—almost as many structures as were built during all of 1958. In addition to the construction of these barge-handling docks and terminals, the shallow-draft water carrier industry has helped stimulate a mass movement of production industry to new plant sites along navigable channels. Since The American Waterways Operators, Inc., began compiling statistics on waterside plant development in 1951 more than 3,000 in-

Two GM 6-110 diesels drive 100 kw, 220 volt ac Delco generators for auxiliary service on the towboat M/V *Girle Knight*.



M/V *Hazel*, built by Nashville Bridge Co. for Crounse Corp. is propelled by a single 900 hp GM Cleveland diesel equipped with Wichita air clutch.



Map of commercially navigable Inland Waterways of the United States as revised and produced by the American Waterways Operators, Inc. Jan. 1960.

dustrial plants have either located or expanded their production facilities in order to take advantage of low-cost water transportation and other water resource benefits.

In modern times the nation's shallow-draft water carrier industry has always kept pace with the growth of the economy and expanded its volume of operations to serve this growth. If the expected general economic upsurge comes in the 1960s, as has been forecast by leading economists, then the shallow-draft water carriers undoubtedly will expand their capacity even more to provide the growing economy with the necessary additional low-cost transportation service."

The editors of this magazine deeply appreciate the opportunity to bring you President Carr's report. His comment on larger horsepower towboats is especially timely for just prior to publication we learned that Federal Barge Lines has ordered another 180 ft. quadruple screw towboat from St. Louis Shipbuilding & Steel Co. The vessel will be powered by four Cooper-Bessemer diesels and will be essentially a duplicate of the M/V *United States* except that the total rated horsepower will be 9000. It is known that at least one other major



Mid-South Towing Company's new towboat M/V *Girle Knight* built by St. Louis Shipbuilding & Steel Co. and powered by a pair of Fairbanks-Morse diesels, each rated 1600 hp at 720 rpm.

operator is considering a towboat in this horsepower range and that several others in the 5 to 6000 hp size are a possibility in 1960.

The following are some of the more recent tugs and towboats to enter service:

900 HP Towboat M/V *Hazel*

Built by Nashville Bridge Co., the M/V *Hazel* has been placed in service by the Crounse Corp. of Paducah, Ky. assigned primarily to the transpor-



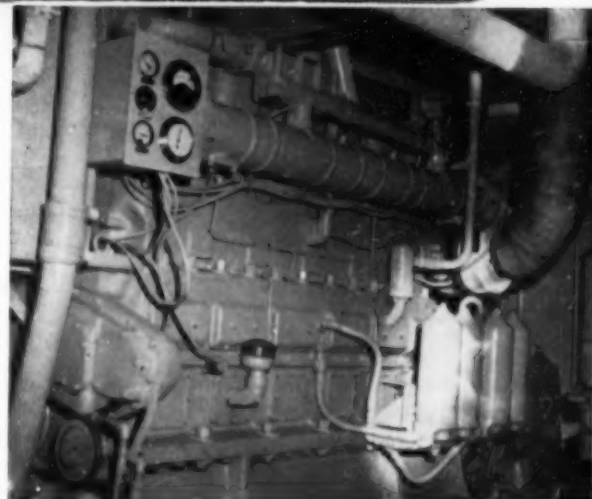
One of the newest tugs in Gulf service is the *Michele A. DeFelice* built by E. W. & A. P. DuPont. Two 600 hp Waukesha turbocharged diesels driving through Western Flexmaster gears supply the propulsion power. One of the main engines is shown right. Note the Winslow filters, and Alnor pyrometer.

tation of coal from southern Illinois and western Kentucky mines to utility plants on the lower Ohio, the Tennessee, and the lower Mississippi. Principal dimensions of the new boat are 90 x 24 x 9½ ft. with a 6 ft. 9 in. draft. Operations of the *Hazel* and the Crounse company's other boats and barges are supervised by John L. Cathey, vice-president of the company, and the new vessel is named in honor of his wife.

Supplying the propulsion power for the *Hazel* is a single GM Cleveland 12 cylinder 567 ATL diesel rated 900 hp at 744 rpm. Equipped with a Wichita air clutch for full control of propeller speed throughout its entire operating range, the engine drives a four-blade 70 x 62 propeller through a Falk 2.5:1 reduction gear. Auxiliary power on the vessel is provided by two 30 kw Caterpillar D-311 diesel generator sets. The *Hazel* is the sixth of her class and differs from her sisters only in that she has the Wichita clutch and ac power. Wheels, shafts, rudders and practically all working parts are interchangeable between the boats. Their hull dimensions and cabin layouts are the same, and personnel can be moved from one boat to another with no problem. Of the six vessels, five (the *Eleanor*, *Barbara*, *Jincy*, *Patricia* and *Hazel*) were built by Nashville Bridge and the sixth, the *Louise*, by St. Louis Shipbuilding and Steel Co. In total, Crounse has seventy-eight 1500 ton coal barges and is now delivering coal at an annual rate of about 6,500,000 tons. A subsidiary, Green River Towing Corp., operates six other towboats.

Principal Equipment

Main engine GM Cleveland Diesel
Air clutch Wichita
Reduction gear Falk
Generator sets Caterpillar
Lube oil coolers Ross

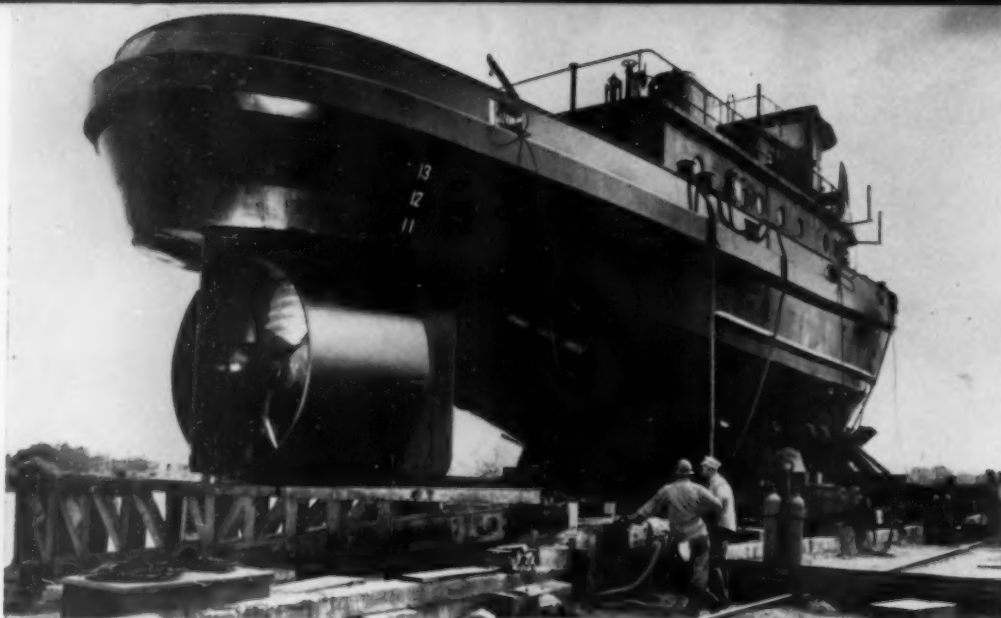


Lube oil filters	CFC Fulflo
Fuel oil filter	Hilliard
Compressor	Quincy
Air controls	Westinghouse Air Brake
Pyrometer	Alnor
Thermostatic controls	Amot
Exhaust silencer	Maxim

1200 HP Tug *Michele A. De Felice*

One of the latest tugboats to be completed by E. W. & A. P. DuPont, Inc. for service in the Gulf of Mexico and surrounding waters is the *Michele A. De Felice*. Built for DeFelice Marine Contractors of New Orleans, the boat has a length overall of 85 ft., a beam of 24 ft. and a draft of 7 ft. 6 in. Since its launching the *DeFelice* has worked solely for J. R. McDermott Fabricators in off shore oil drilling operations moving and hauling large drilling structures. It is built to ABS standards and has crew accommodations for six.

Giving the *DeFelice* a full load speed rating of 10 knots is a pair of Waukesha model 6 LRDBSM turbocharged diesels each rated 600 hp at 1200 rpm. The engines drive 46 x 66 stainless steel wheels through Western Flexmaster model 180 reverse and reduction gears with a 3.0:1 ratio. For ships service, two 70 hp Waukesha diesels are installed and drive 30 kw Electric Machinery generators at 1200 rpm. One of five diesel vessels in



the DeFelice fleet, the *Michele A. DeFelice* is captained by Robert Guidry.

Principal Equipment

Main engines	Waukesha
Turbochargers	Elliott
R & R gears	Western
Auxiliary diesels	Waukesha
Auxiliary generators	Electric Machinery
Fuel & lube oil filters	Winslow
Pyrometer	Alnor

3200 HP M/V *Girlie Knight*

One of the river's newest towing firms, the Mid-South Towing Co. of Tampa, has taken delivery of the towboat *Girlie Knight* designed and built by St. Louis Shipbuilding & Steel Co. Power for new vessel is furnished by two Fairbanks-Morse model 38D81/M ten-cylinder diesels each rated 1600 hp at 720 rpm. With Falk 21MB reverse-reduction gears, the four-blade 102 in. diameter cast steel propellers turn at 208 rpm. Oil lubricated,

centrifugally cast bronze bearings are used to carry the propeller shafting at the stern tube and stern strut. A spherical roller steady rest bearing is provided in way of stern tube and stern strut bearings, and separate lubricating oil circulating systems are provided for each propeller shaft. The main engines and gears are pilot house controlled by Westinghouse Air Brake pneumatic systems. Engine cooling water is circulated through a skin cooling system. Engines have individual deck mounted oil bath air intake filters. Two GM 6-110 diesels drive 100 kw Delco generators for electric power and the switchboard is designed for parallel operation of the generators with panels for 220 and 110 volt distribution. Hydraulic type steering systems are used for the backing and steering rudders with mechanical follow-up control. The steering gear room is immediately aft of, and is accessible from the engine room, making it possible for the crew to service steering power and control units regularly and easily.

Hull dimensions of the *Girlie Knight* are 156 ft. x 35 ft. x 11 ft. with a normal draft of 8 ft. The hull is heavily framed and built to full ABS standards. Kort nozzles are employed.

Built by Jacobson Shipyard, the *Flo W.* is operated by Merritt-Chapman & Scott and during 1959 it was used on the Galop Island Dredging project on the St. Lawrence Seaway.

100 ft. towboat built by Dravo Corp. for Dalzell Towing Co. has Kort nozzle and combination backing and steering rudders. It is the first of its type for harbor and seagoing service and is powered by a GM Cleveland 16-567C diesel.

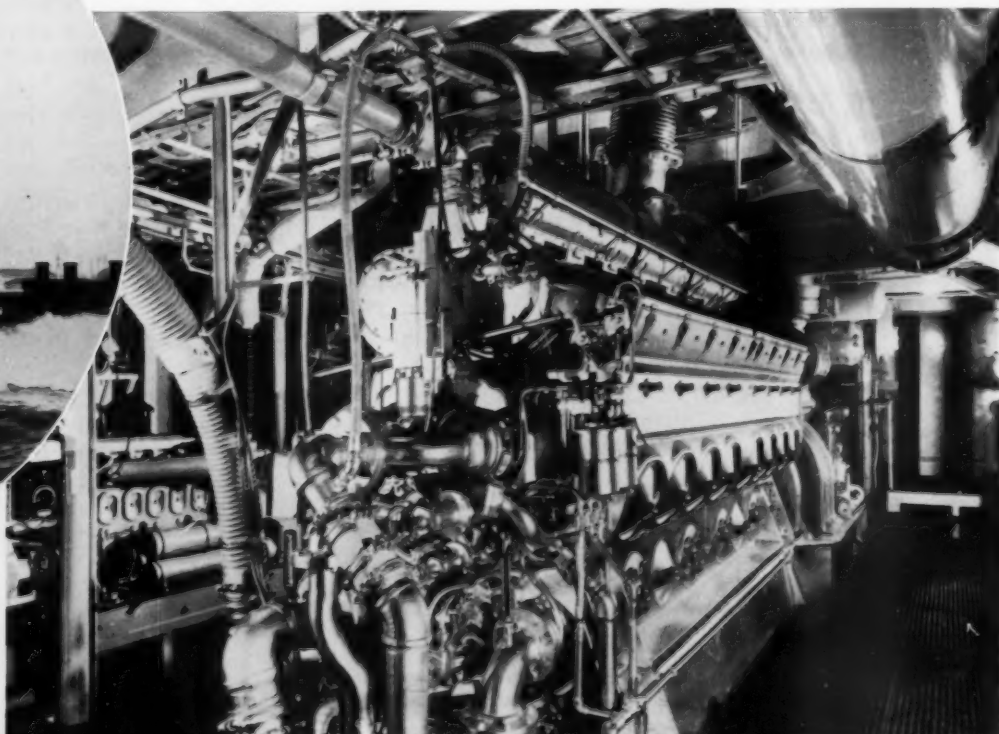
Principal Equipment

Main engines	Fairbanks-Morse
R & R gears	Falk
Pneumatic controls	Westinghouse Air Brake
Intake air filters	Air Maze
Exhaust silencers	Burgess-Manning
Lube oil filters	Briggs
Fuel oil filters	Briggs
Air compressors	Quincy
Governors	Woodward
Auxiliary diesels	General Motors
Auxiliary generators	Delco

1600 HP Seaway Tug *Flo W.*

The *Flo W.*, latest tug to join the Merritt-Chapman & Scott fleet, was designed by the Marine Design Section of Cleveland Diesel Engine Division of General Motors and built at Jacobson Shipyard, Oyster Bay, N. Y. She was christened in honor of Mrs. Louis Wolfson, wife of the chairman of the board of Merritt-Chapman & Scott. The *Flo W.* went into service on the St. Lawrence Seaway in the first week of May, 1959 and worked on the Galop Island dredging project until the completion of this operation. The *Flo W.* is 95 ft. overall and has a 26 ft. beam, molded. Supplying power for propulsion is one GM Cleveland model 567C, 1600 shp diesel engine that drives a 8½ ft. five-bladed propeller through a Wichita controlled slip clutch and Falk 4:1 reduction gear. She is rated 12 knots light and has a fuel capacity of 18,878 gals. Auxiliary machinery includes two GM 6-71 diesels that drive 75 kw, 120 volt Delco generators. One generator supplies power for ship's service and the other operates the 50 hp towing machine used in handling dredge scows. The drum is capable of holding 1800 ft. of 2 in. dia. hawser. Also aboard is a GM 2-71 20 kw emergency generator set.

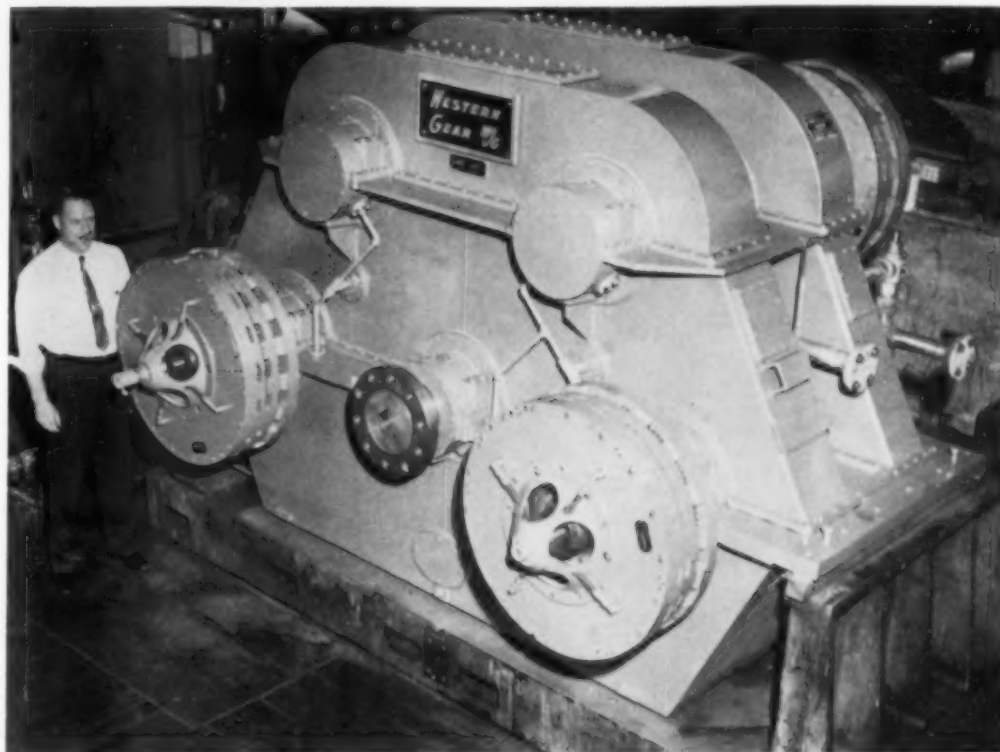
Engine room of the *Flo W.* with its 1600 hp GM Cleveland diesel that drives through a Wichita controlled slip clutch. Note Marquette governor and Air Maze air filters.



COMBINING REVERSING REDUCTION GEARS

TRENDS to increasing horsepower for all types of marine diesel propulsion while retaining the lightweight per horsepower features have raised questions as to the feasibility of available horsepower from a single power plant. Increasing interest is being shown in the development of combining gear drives to accommodate two or more diesel engines. An interesting development along this line is the combining reverse reduction gears manufactured by Western Gear Corporation to combine two 1500 hp diesel engines to a single propeller shaft to provide 3000 shp at the required propeller speeds. This concept is parallel to the development at Western Gear of the new PCMR pneumatic reverse and reduction gear which utilizes Wichita air tube type clutches with functional arrangement of gearing, bearings, shafting, and clutches. The external location of the clutches which are independently supported from the gear provide easy maintenance accessibility and elimination of misalignment as a clutch wear factor.

Application of the basic design principles of the single gear to the construction of a combining reverse reduction gear proved a natural sequence in the development of this type of marine propulsion gear. To accommodate both ahead and astern drives for both engines, four clutches are required—two for ahead, two for astern. The concept of the gear is more clearly shown in the isometric schematic which depicts the functional gear arrangement together with the clutch locations, input shaft, and output shaft arrangements. A very interesting facet of this application is its inherent suitability for good torsional characteristics. It was found that the use of the Western Gear quill shaft drive principle together with the Wichita air-tube type clutches provided highly satisfactory torsional characteristics even though two reciprocating engines were connected to the same gear. The combination of the torsionally flexible quill drive together with the synchronizing characteristics



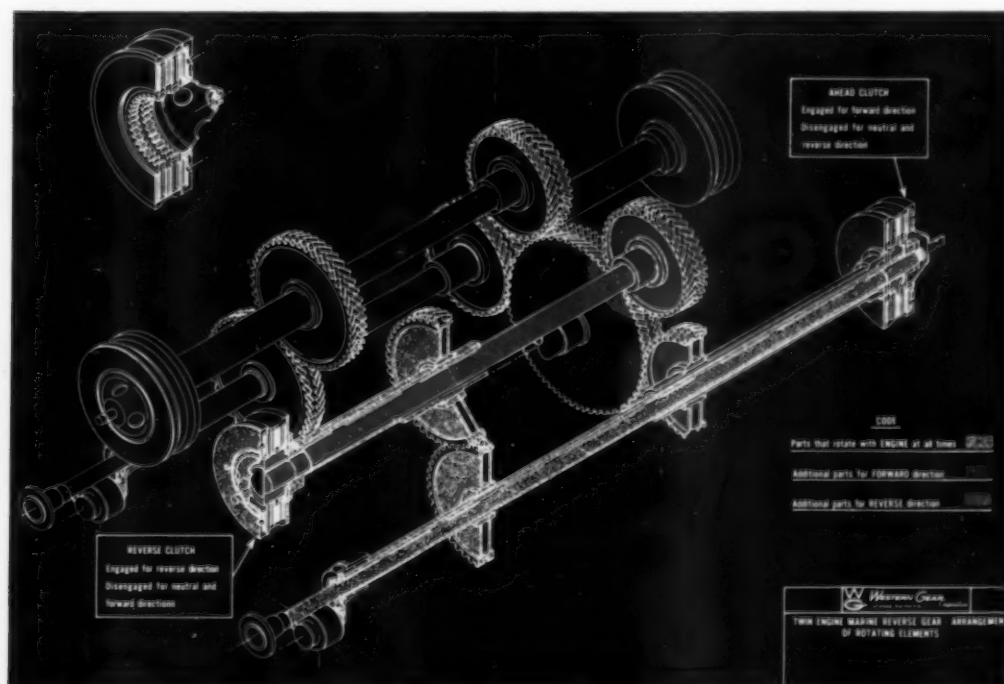
New combining reverse reduction gear can combine two 1500 hp diesel engines to single propeller shaft to provide 3000 shp at required propeller speeds.

of the multiple clutch arrangement offered the answer to what otherwise could have been a knotty torsional problem.

All bearings of the gear are individually accessible and are of the split sleeve type utilizing separable caps making inspection and maintenance relatively simple. All clutches are independently supported to provide positive alignment between driving and driven elements and are located on shafts other than between the engine and the gear. This per-

mits easy disassembly for maintenance without disturbing the connection between the engine and the gear. Basic gear housing alignment is maintained by the use of Western Gear's three-point mounting system which enables accurate prediction of gear case deflection so that true housing alignment can be reproduced in the vessel. The units are equipped with complete self-contained lube system; in this case requiring dual oil pumps, one for each engine drive, oil filter, cooler, and all necessary oil piping. Other construction features of these units included the use of fabricated steel housing, fabricated gear construction, utilizing continuously rolled ring forgings for all gear wheel rims, independent mounting of the lower section of the housing to permit complete disassembly of the unit without disturbing the gear housing alignment, hardened clutch hubs for long wear, pressurized lubrication system to provide oil under pressure for bearing and gear mesh lubrication, and multiple shoe thrust bearings.

The problem of throttle and clutch control for synchronization in both the application of fuel to the engine system and air to the clutches was successfully handled through the use of standard Westinghouse Air Brake components tied into a completely engineered system recognizing the requirements for both the engine and the gear control. Units of this type are available to accommodate two to four engines and to provide up to 20,000 shaft horsepower from a single gear unit.



Schematic drawing shows arrangement of reversing reduction gears in forward and reverse.



Emerging from a tunnel in the mountainous Gurpa-Guyhandi section of the Indian Railways line between Dhanbad and Moghalsarai is an Alco DL-500 "World" locomotive with a long freight. A hundred "World" locomotives are in service on the Dhanbad-Moghalsarai run.

DIESEL IMPACT IN INDIA

Modern Diesel-Electric Locomotives Help Improve India's Rail Service; 100 Alco "World" Units Operating Under Changeover Program

THE quiet, relentless switch from steam to diesel-electric railroad power is making an impact today in India over a rail system (35,000 miles) that ranks among the four largest in the world. The trend toward the "new" in mainline motive power—a changeover that is virtually complete in the United States—started on the Indian Railways in 1957 when the first of a group of modern, American-built diesels entered service. The locomotives were obtained to further strengthen the motive power roster of a progressive, well-run railway, and to keep pace with a general economic development program in India.

India's railways were nationalized in the late 1940's. Standardization of rolling stock and com-

ponents is now underway—second-stage modernization and expansion continues under a second "five-year plan". India's railways carry more than a billion passengers and move freight almost 50 billion ton miles each year. The United States, Great Britain and Germany are the only countries in the world with larger railway systems than that of India.

Helping set the pace in Indian railroading are 100 Alco "World" diesel units. These 1800 hp engines are performing well on rugged runs between Dhanbad and Moghalsarai. The Indian Railways took delivery of the first 20 units of the total order late in 1957; the remaining 80 were placed in service early in 1959. The DL-500 loco-

Looking down the production line at Alco's Schenectady plant from the engineer's position of a DL-500 locomotive built for India. Crane lifts a 12 cylinder model 251 engine identical to those that drive the "World" locomotives in India.



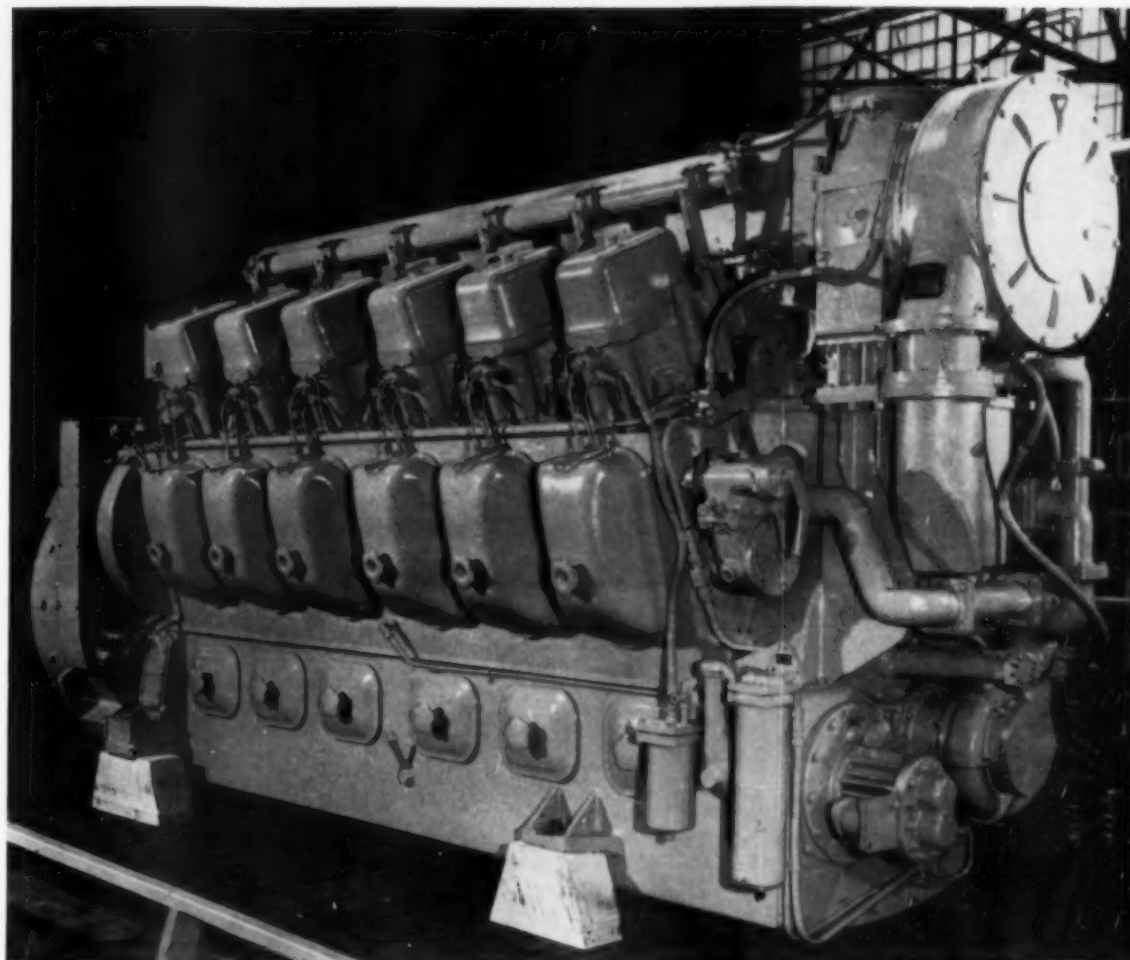
motive design was introduced by Alco Products, Inc., in 1953, demonstrated overseas in 1954 and now is in volume service in several other nations, including Spain, Australia, Pakistan, Peru and Argentina. Alco claims to be the world's leading exporter of diesel-electric locomotives.

The DL-500 "World" is built by Alco at Schenectady, N.Y., and, from Alco design, by the company's Canadian affiliate, Montreal Locomotive Works, Ltd., and its Australian licensee, A. E. Goodwin, Ltd. The locomotive is powered by Alco's model 251, 12-cylinder V-type engine which has been in service for nearly four years in a variety of railroad, stationary and marine applications both in the United States and overseas.

On the "through goods" service that the Indian Railways applies its "World" units, the locomotives handle varying tonnages over the 156 miles (249 kilometers) between Dhanbad and Moghalsarai. The average haul is 2500 tons. On the ruling 1.25 per cent grade between Gujhandi and Gurpa, on the Moghalsarai-Dhanbad trip, 950-ton trains are booked at 20 mph. Average speed for the entire run is 30 mph. Each locomotive averages 7000 kilometers a month. The combined fleet of 100 locomotives shows an average availability of 96.5 per cent.

Indian Railways currently is conducting extensive dynamometer and oscillation trials on the "World" locomotives. To date, starting-effort tests have shown that the locomotives are capable of developing 61,600 lbs. of drawbar pull—or 25 per cent adhesion—without sand or wheel slip. All of the units are of standard broad gauge design and were built to the Berne Conference International loading gauge. The locomotives are equipped with cast steel swing bolster, three-axle, three-motor trucks of a type designed and developed by Alco for service in overseas railways. A cast steel bolster receives the locomotive weight through a large diameter center pin, and transmits it to the truck frame through elliptic springs. The cast steel frame rests on coil springs that finally transmit the weight to the journal boxes by means of equalizers installed in the unit.

The 12-cylinder model 251 V-engine is a 4 stroke,



Providing prime power for the Alco "World" locomotive in India is the turbocharged and aftercooled 12 cylinder model 251 V-type diesel engine. The engine, developing 1950 hp at 1000 rpm, drives a direct-connected General Electric model GT-581 main traction generator. Engine is equipped with Woodward governor, Roper lube pump, Nugent primary and secondary fuel filters and American Bosch fuel injection equipment.

turbocharged and aftercooled unit that develops 1950 hp at 1000 rpm. The engine drives a direct-connected General Electric Model GT-581 main traction generator. The generator is a 10-pole, shunt-wound machine with commutation poles, a single bearing and a gear-case that drives the excitation generator, auxiliary generator and the blower for the traction motors on the front truck. Tractive force is obtained from six General Electric Model GE-761 traction motors suspended by

the nose from the six axles of the locomotive. Connection at start is through three series of two motors, in parallel across the main generator, and, as speed increases, there is a step-off field shunting, a reconnection to six motors in parallel, full field, and a final step-off field shunting. These automatic transitions enable the locomotive to fully utilize the diesel engine's power at all speeds.

A large fan, revolving in a horizontal plane near the roof, draws air through the radiators. Fan speed is regulated, according to engine-cooling water temperature, by the amount of slippage of an electromagnetic clutch. Engine speed is controlled by a throttle lever with eight notches, plus an idling position. A separate reverse control lever is also part of the control compartment equipment. Individual engine brake and combination compressed-air engine brake and train vacuum brake levers are also provided. "Dead man's control", standard equipment on the Indian locomotives, operates through a foot pedal that must be depressed to drive the engine and hold the brakes in the release position.

Of the 100 locomotives delivered to India, 42 have dynamic braking equipment, in which the traction motors are reconnected across suitable resistors as separately excited dc generators. In these units, the traction-motor fields are connected in series with the main generator. The intensity of the braking effort is regulated by the amount of field excitation.



NEW PACKAGE BRUSHLESS GENERATOR ANNOUNCED

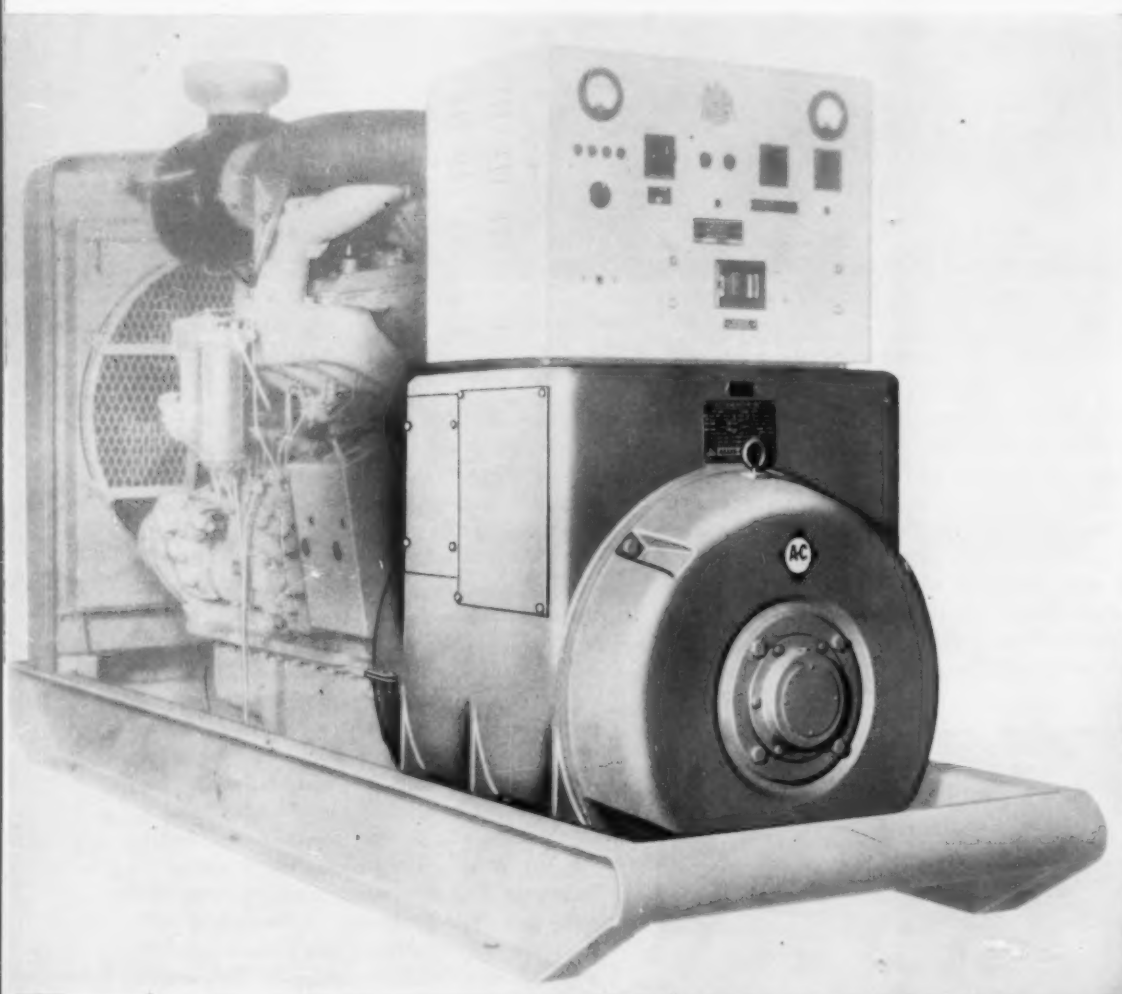
**Allis-Chalmers Unit Is Available
In 100-175 KW, 60 Cycle, 1800 RPM**

A NEW package brushless generator designed to eliminate sparking has been announced by Allis-Chalmers for a wide variety of applications, including oil well drilling, hospitals, construction projects, ship board, radio and television stations, mines, quarries and factories. Shorter and streamlined in appearance, the generator has its auxiliary equipment compactly mounted within the yoke enclosures. The design permits direct mounting of a switchboard on top of the unit, keeping cable runs to a minimum length.

The conduit space is located on top of the generator to provide an enclosure which is integral

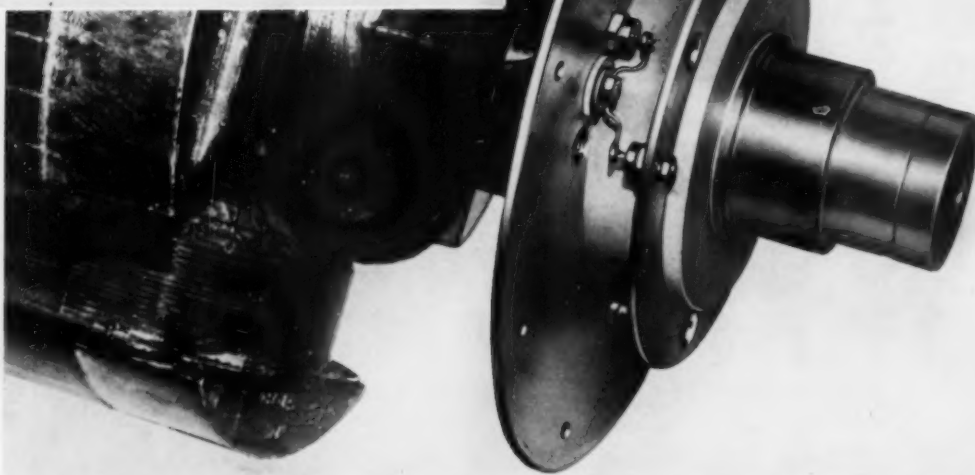
to the frame. Instruments are at a readable height and placed in a side recess, which also shelters a forced-cooled, completely static, current-compound voltage regulator. Conduit entry can be made from left or right hand by means of removable plates. This adds to the generator's flexibility. The generator features a new static voltage regulator. A-C engineers report it matches brushless exciter characteristics, provides operating flexibility and improves generator voltage regulation.

A selection of adapters makes it possible to attach the generator to most any driver. The equipment may be modified to include such accessories

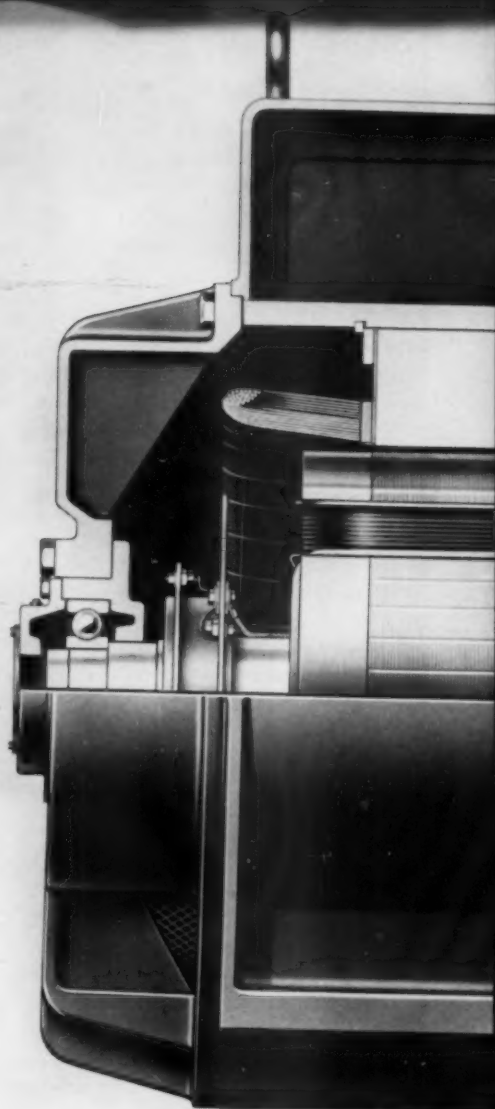


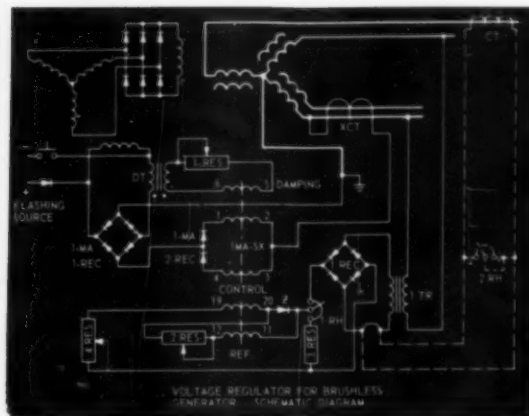
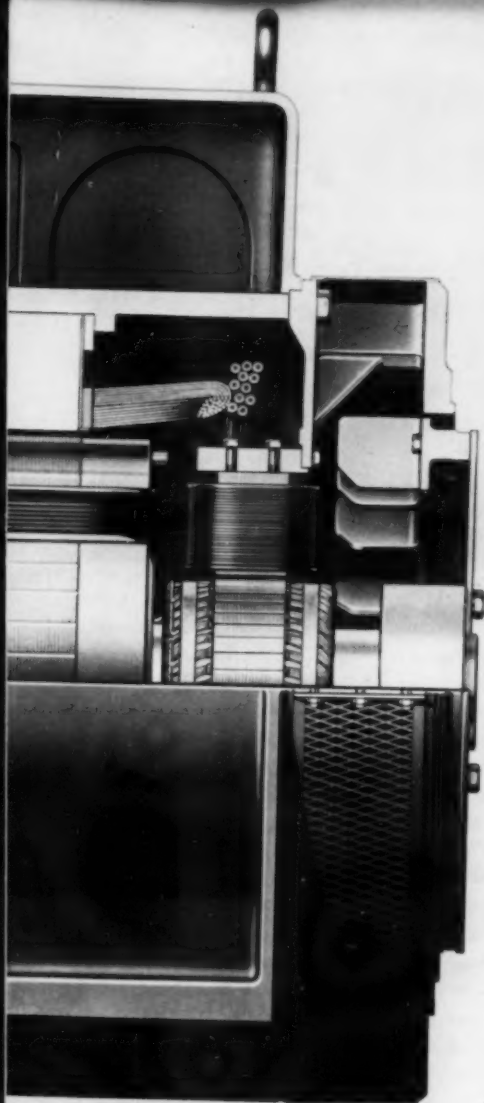
New Allis-Chalmers package brushless generator permits two-bearing arrangements, suitable for belted or direct coupling to any motor or engine, and direct mounting of a switchboard on top of the unit.

Silicon rectifiers, mounted on a rotating plate, replace the conventional commutator in the Allis-Chalmers brushless generator as the means of converting alternating current to direct current for the generator field.



Sectional view of Allis-Chalmers brushless synchronous generator. ➡





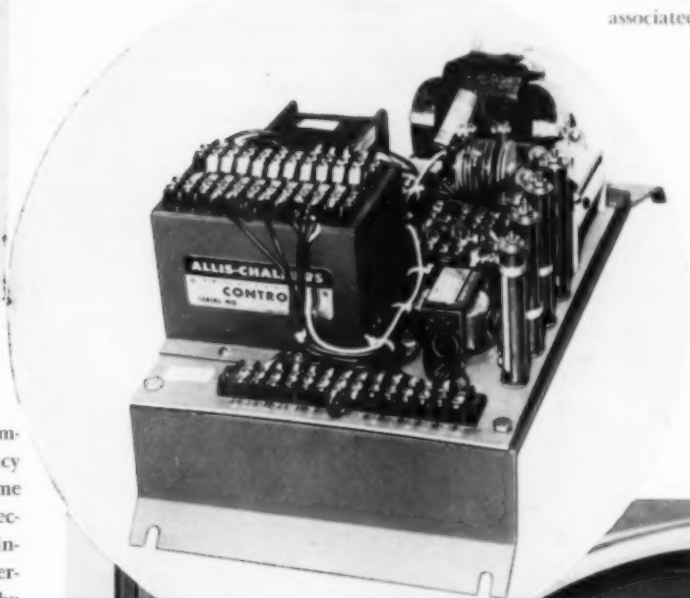
2400 volts, three phase, 575 volts, three phase, and 120/240 volts, single phase, as well as special voltages on request.

Single and two-bearing generators are available to match individual drivers. Single-bearing generators for internal combustion engines, close-coupled to standard SAE flanges, provide maximum performance in minimum length. Two-bearing generators are available for belt drives or direct connection.

The generator's indestructible damper windings are die-cast in the face of the rotating field pole to provide good paralleling characteristics. A ventilation system effectively removes heat before it can shorten insulation life. Single-bearing models utilize a ventilating fan that mounts directly to the engine flywheel.

New grease-lubricated bearings are cartridge mounted and can easily be inspected by removal of the end cap without disturbing the housing. With bearing housing removed, diodes and generator interior can be inspected without disturbing the bearing. The lubricant can be changed while the unit is operating. Oversize bearings are used. The exciter is located inboard of the coupling hub. This permits the generator to be shorter, lighter and more compact, in addition to saving space, reducing torsional vibration and providing additional protection to the exciter.

The field poles are dovetailed to the shaft to provide maximum safety and protection, even in the event of overspeed. Silicon rectifiers, mounted on a rotating plate, replace the conventional commutator as the means of converting alternating current to direct current for the generator field. Silicon rectifiers minimize maintenance normally associated with commutators and brushes.



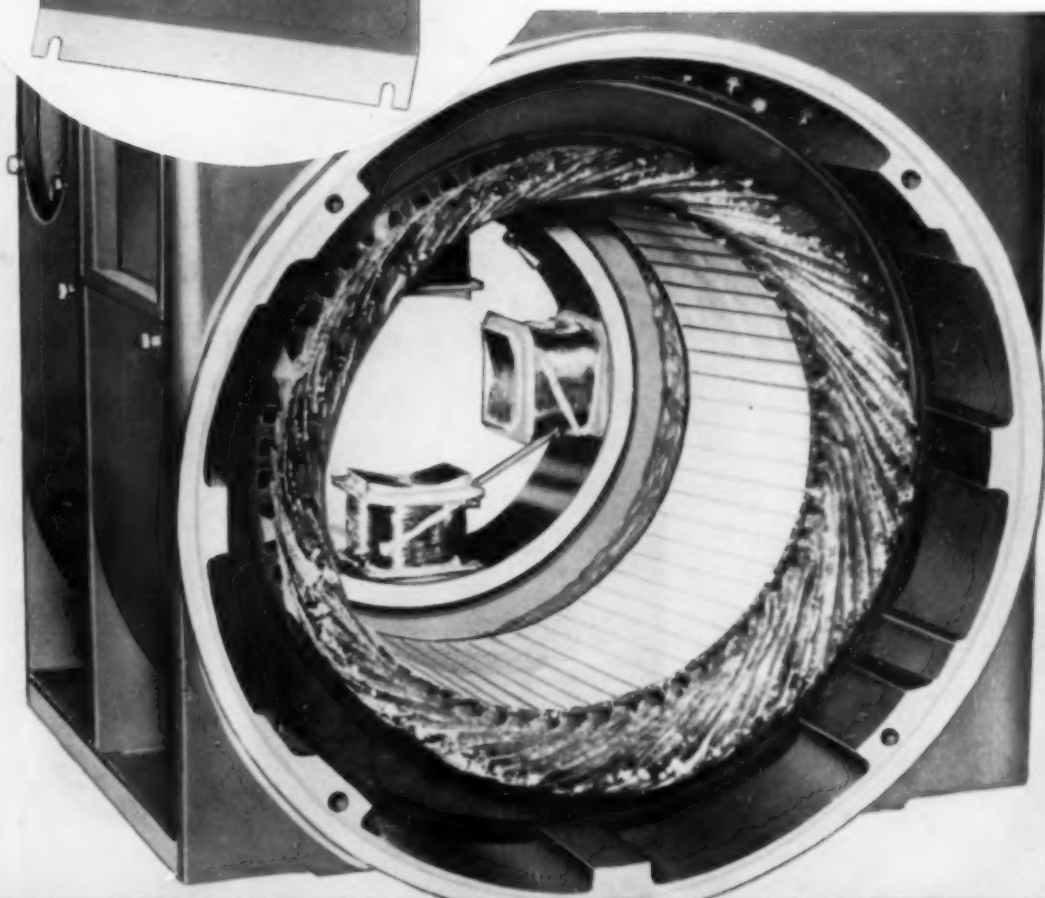
Overall view of brushless generator's static regulator control unit. Voltage regulator consists of a silicon diode sensing element, rheostat dial for voltage adjustment, magnetic amplifier and booster transformer.

as three-phase voltage sensing, cross current compensation for parallel operation and frequency meter or combination frequency elapsed time meter. The enclosure provides drip-proof protection for the generator, exciter, regulator and instrument package. Screens cover ventilating apertures through which air is drawn or expelled by a large capacity, single-piece aluminum fan. Cooling is adequate for 40-50 C rise machine.

The new design permits two-bearing arrangements suitable for belted or direct coupling to any motor or engine. Bearings permit in-service lubrication and flushing. Available in 100, 125, 150 and 175 kw, 60-cycle, 1800-rpm units, the new generator is designed to deliver a low telephone influence factor (TIF) and minimum radio and television interference.

Allis-Chalmers brushless generators are designed and built to meet NEMA, AIEE and ASA standards. Units are also available to meet ABS and AIEE, Marine No. 45 and Lloyds of London specifications where there are requirements. The generators have a standard 0.8 power factor and are available with 60 or 50 cycle frequencies in range ratings of 50 through 300 kw @ 1200 rpm and 40 through 175 kw @ 1800 rpm. They are available in standard 12-wire voltages of 120/208, 138/240, 240/416 and 276/480; and four wire

Class A or B insulation materials are available in the brushless synchronous generator to meet various ambient temperature ranges. Special insulations are available for specific jobs.



MAINE PUBLIC SERVICE CO. INSTALLS PEAK POWER PLANT

MU-42 Power Plant Combination Delivers 4200 KW Block of Power for Remotely Controlled Peaking Service; Three 16-567C Diesel Engines Are Housed in Separate, Transportable Vans at Substation in Northeast Maine

THE first application in the New England area of a new automatic generating plant developed and built by the Electro-Motive Division of General Motors, was demonstrated recently at a substation of the Maine Public Service Co. The station is at Flo's Inn, five miles from Presque Isle in the northeast corner of the U.S. The new plant went on the line initially when C. Hazen Stetson, president of Maine Public Service Co., telephoned the company's central dispatcher at Presque Isle who pushed remote control buttons to automatically start the plant's three separately housed diesel engine generating sets.

The Maine installation is designed to handle the firm's peak power requirements. The three units and control station at Flo's Inn substation are designated as an MU-42 plant. The layout is comprised of three vans, each containing an MP-26 power unit with a nominal rating of 1400 kw each and a separate van containing an MC-26 electrical control system. The MU-42 power plant combination is designed to provide a composite, integrated 4200 kw block of power at 4160 volts for remotely

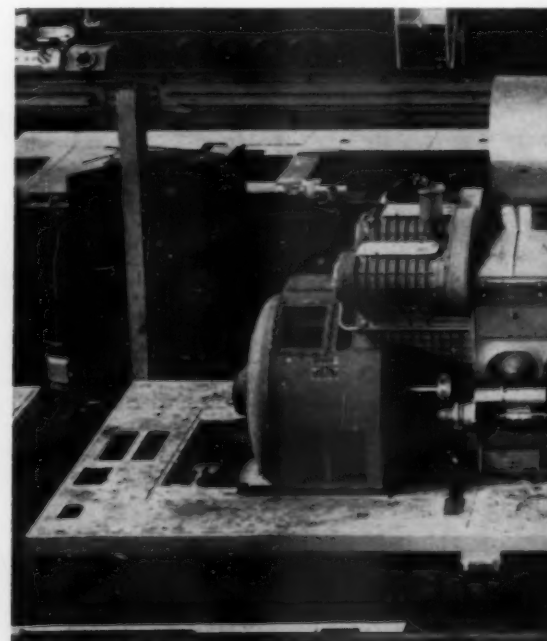
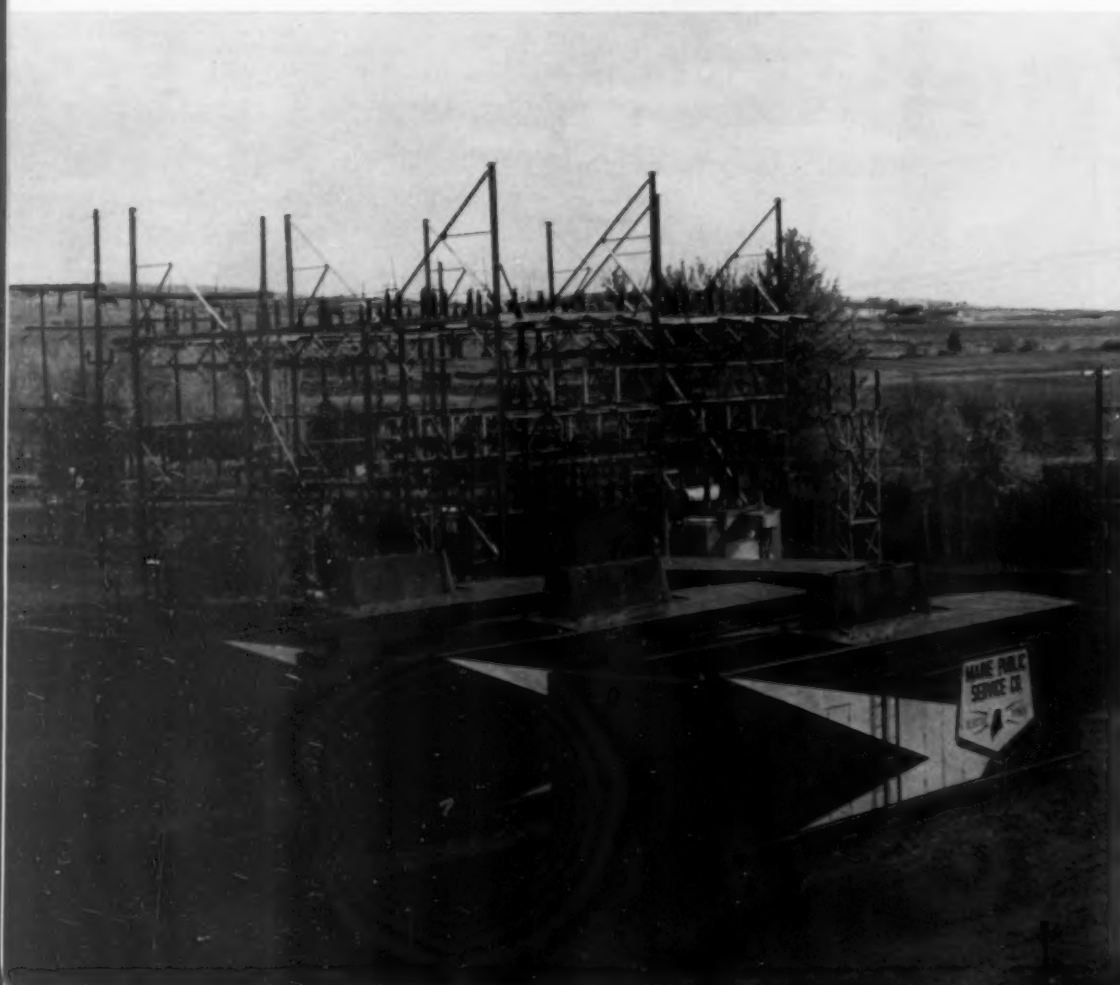
controlled, supplementary use in conjunction with existing utility power systems. The power unit consists of an Electro-Motive model 16-567C diesel engine driving a generator arranged for 3 phase, 60 cycle, 4160 volt operation. The engine, with bore and stroke of 8½x10 in., is directly connected to the generator. Starting is by a battery powered, solenoid actuated Dyer drive. Oil coolers, filters and radiator assembly are integral with the base mounted generating set. An engine control panel permits local manual operation of the engine for maintenance or testing purposes. A 15 kw immersion heater is powered from an auxiliary transformer in the electrical control unit. The MU-42 automatic control system is designed so that a single impulse signal will cause all three MP-26 power units to go to full load. The automatic control system will start the units, synchronize them with the line, close each individual breaker and load the power units to full load. This is accomplished serially as dictated by the control sequencing. The basic MU-42 power plant is designed for use only as an integrated 4200 kw block of power; load sharing or partial load opera-

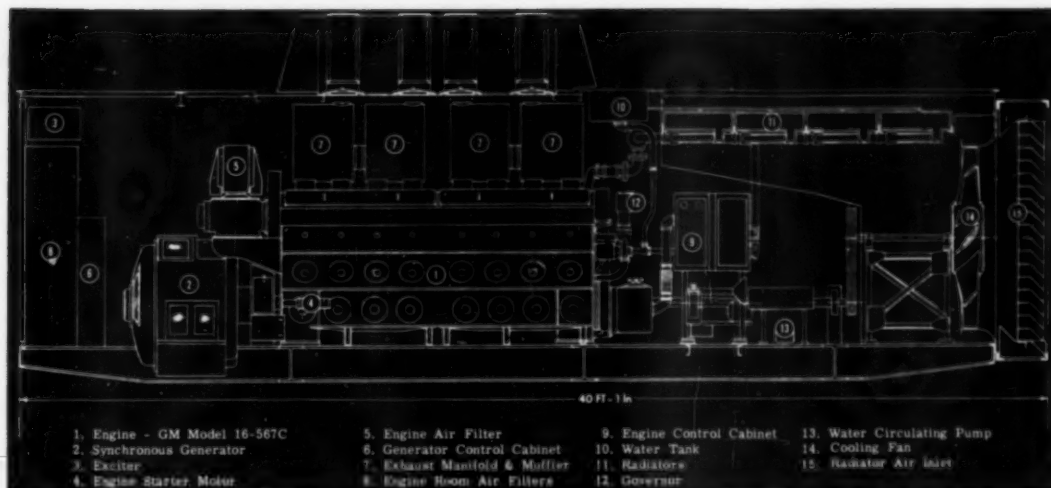
tion of the MP-26 units is not provided. (For a complete description of the plant and equipment see DIESEL AND GAS ENGINE PROGRESS, Aug. 1958 and Jan. 1959)

The decision by Maine Public Service Co., to install the Electro-Motive units was made following a study by Stone and Webster Service Corp., of the character of the company's load, the need for additional generating capacity and the most economic means of providing that capacity, according to Stetson. "Addition of this type of plant to our system not only provides quick peaking and reserve capacity but results in a considerable saving in initial investment over the conventional equipment used for this type of service," he said.

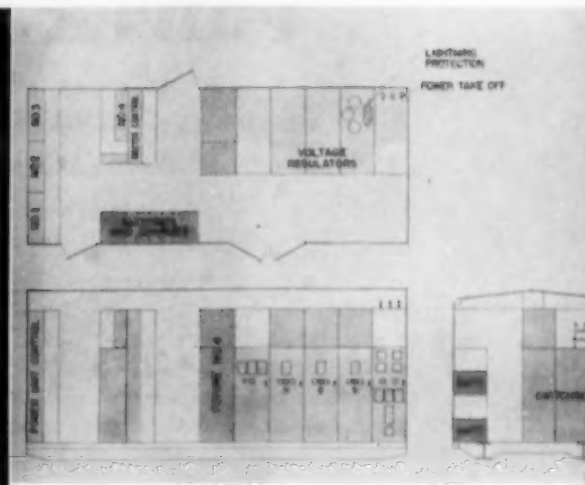
Maine Public Service's load pattern is typical of the average utility in which approximately 20 per cent of the total load on peak is only required about two per cent of the time. With the new equipment, lower fixed cost can be realized since the MU-42 plant carries a fixed cost of approximately \$15 per kw/yr. compared with about \$28 per kw/yr. for what has been considered conventional equipment for this type of work. The Maine installation of specialized peaking equipment is not an isolated application but represents an economical solution to a problem facing all utility companies in varying degrees. The majority of utility loads are such that a certain portion of the load requirements are of extremely short duration and justify installation of low investment, specialized peaking generation.

Flo's Inn substation of the Maine Public Service Co. Station consists of three MP-26 power units each with GM 16-567C diesel engine driving a 1400 kw generator and control van, rear, visible at right angle to center unit.





Line drawing showing van interior arrangement.



Control van layout.

Mr. Stetson stressed three considerations in outlining operation of the plant:

Low investment compared with conventional generating plants.

Automatic operation which does not require full-time personnel standing by.

Quick start . . . on the line at full load in less than 90 seconds.

Another feature of the new plant is its transportability; with all components housed in units easily moved from one location to another. Unusual growth load, then, can be met by simply moving units into the area of greater demand without the need for more transmission facilities.

The change in peak power demand characteristics brought the need for pushbutton generating units, explained Richard L. Terrell, GM vice-president and general manager of Electro-Motive. "If these units had been available many years ago I doubt very much if they would have caused a ripple of interest," Terrell said in discussing the new installation at a press luncheon. "In the past, peaking was handled by older steam plants as they were relegated to this type of service by the bigger and more modern base-load plants. In the

effort to improve the efficiency of these base load plants, bigger and bigger steam plants were built. As these large plants have been replaced by larger ones, there's no place for the former big ones to be used economically. While in base load operation, a modern coal-fired steam turbine can produce a kw of electricity more cheaply than a diesel engine. The reverse is true, however, when the steam plant is taken off base load and reduced to a plant factor of less than 40 per cent. It is a parallel, in a certain sense, to the huge steam locomotives which flourished prior to the adoption of the diesel locomotive. To meet demands for increased horsepower, designers of steam locomotives built bigger and bigger machines up to the maximum possible within the clearance diagrams of the railroads. As they became more inefficient with age, they could not be down-graded to branch line or switching service. They simply were too big.

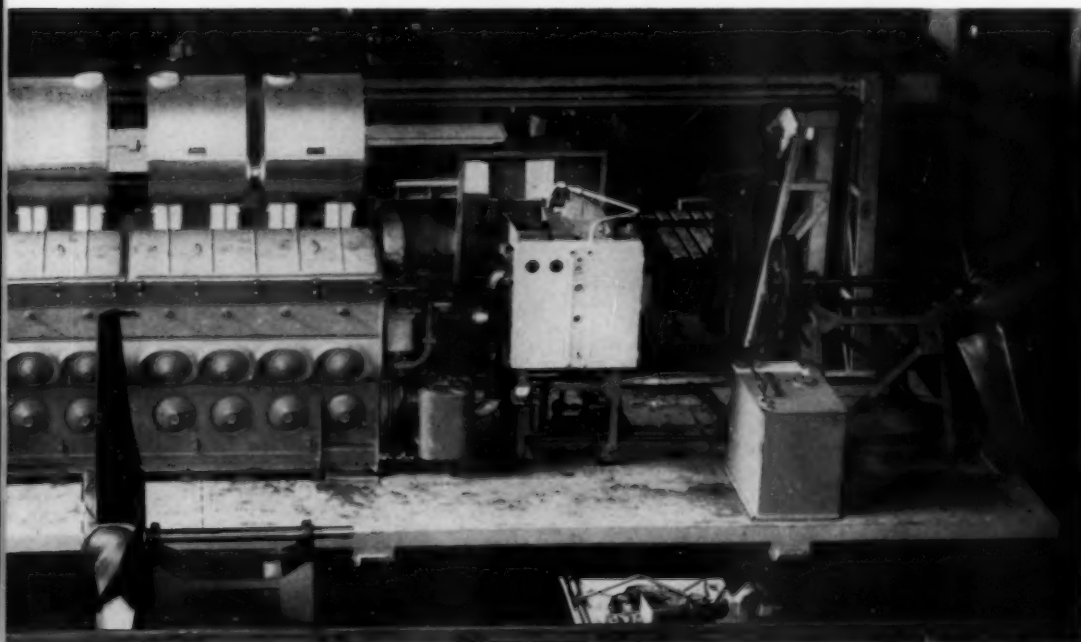
"Another important factor limiting use of these steam plants in peaking service is the high temperatures and pressures that have been reached in the more modern plants," Terrell continued. "Such temperatures (1400 degrees and above) and pressures pose no particular problem when the plant

is in base load operation. In peaking service, however, power is needed very quickly for short periods—on and off operation, so to speak. These high temperatures and pressures, whether they be in steam or internal combustion turbines, make quick starts intolerable because of thermal shocks."

The engine generator vans, each 40 ft. 1 in. long, and the control van, 24 ft. long, were completely assembled in Electro-Motive's La Grange, Ill., plant, shipped by rail to a terminal in the northeastern state and trucked to the Flo's Inn station. The larger van weighs 105,000 lbs. with full supplies; control van weight is 34,000 lbs.

Power units were shipped by rail to terminal in Maine; then trucked on low-boy trailers to Flo's Inn substation location five mi. northeast of Presque Isle.

MU-26 power unit under construction at Electro-Motive plant. Light area is floor of van. Engine is GM 16-567C model. Control panel, right center, permits manual operation of set for testing and maintenance. Overall van length is 40 ft. 1 in.



POWER BACKSTOP FOR AIRPORT

500 KW Waukesha Emergency Diesel-Electric Generating Set Installed at New Moisant Terminal, New Orleans

NEW Orleans, where nearly 900,000 persons reside in one of America's largest (in square miles) metropolitan areas, is a southern gateway to the wealthy, populous middle section of the United States. More than 200 flight arrivals and departures, representing seven domestic and seven international carriers, are scheduled each day at New Orleans' Moisant International Airport. This jump-off spot for Central and South America is located 12½ miles from downtown New Orleans.

Workmen last summer were completing construction of a new, functional terminal building that will help Moisant to handle more efficiently its heavy volume of business. The terminal, measuring 600 x 200 ft., is generally two stories high with a third story in part of the building. Two enclosed piers for passengers and operations offices extend out from the building, where space is provided for ticket counters, dining facilities, baggage counters, control tower, weather station, post office, health, immigration, customs and other facilities.

Two feeders from the Louisiana Power and Light Co. supply power to the new terminal. Should this service ever be interrupted, airport operations could continue with power supplied by a 500 kw Waukesha-Electric Machinery diesel-electric emergency generating set. Prime mover is a V-type, 12 cylinder, model VLRDBSU turbocharged Waukesha diesel engine, rated 1330 bhp at 1200 rpm

with 8½ in. bore and stroke and 5788 cu. in. displacement. This engine drives a bracket type, two bearing Electric Machinery generator rated 500 kw at 900 rpm, 3 phase, 60 cycle. It has a dual voltage rating of 2400/4160 volts. A 125 v exciter is direct connected to the generator.

Upon power failure, Westinghouse switchgear will signal the Waukesha engine, which will start automatically, bring itself up to operating speed and temperature and assume the full emergency load of the terminal. The generator set will provide lighting for the 7000 ft. long east-west runway, the 6000 ft. north-south runway and the 5000 ft. north-east-southwest runway, in addition to the control tower, pump house and terminal building.

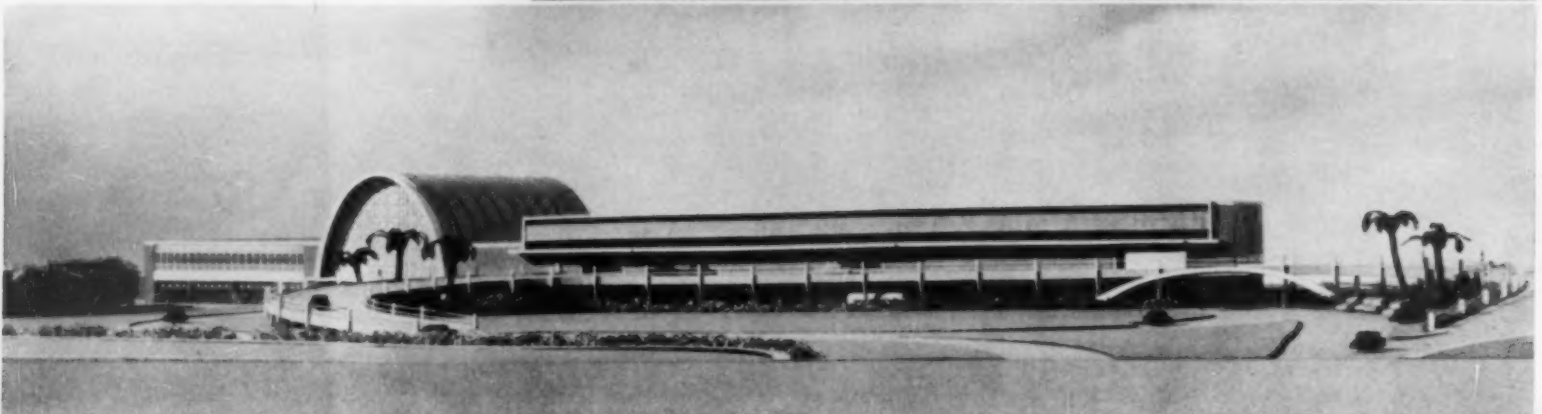
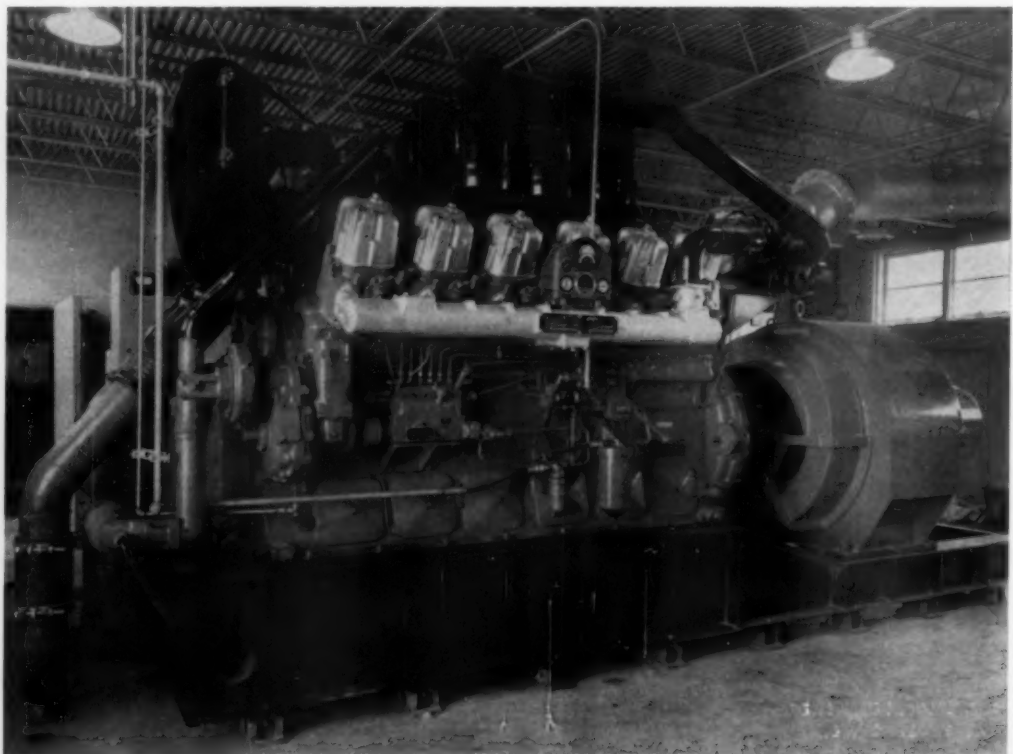
The Waukesha engine has a Young heat exchanger and is equipped with multiple Vortex oil bath air cleaners and a separately mounted, full-flow type, 14 element Winslow oil filter. Individual Ameri-

can Bosch fuel injectors serve each cylinder. The hydraulic governor is a Woodward UG8. Starting is provided by a 48-volt Leece-Neville electric starter. The muffler is a Maxim model M30.

A Falk model 46A-4 Air Flex coupling connects the engine directly to the generator. The generator set is mounted on a rigid steel frame constructed of 21 x 8¼ in. wide flange 62 lb. beam and cross braced. It is supported by 16 Korfund model LK/D vibro-isolators with neoprene sound pads, which are cemented to the base of isolators and to the floor. A Worthington GAU fuel oil transfer pump is driven through a Falk Steelflex coupling by a 1 hp Continental electric motor. The firm of Goldstein, Parham & Labouisse was the architect for the terminal building; Bedell & Nelson, Consulting Engineers, designed the emergency generator building. Reagan Equipment Co., Waukesha distributor in New Orleans, were suppliers of the engine-generator set.

Moisant Airport power supply is protected by this 500 kw Waukesha-Electric Machinery diesel-electric emergency generating set. The V-type, 12 cylinder, turbocharged VLRDBSU engine is rated 1330 bhp at 1200 rpm. Engine is equipped with Elliott turbocharger, Young heat exchanger, Vortex air cleaners, Winslow lube oil filter, American Bosch fuel injectors, Woodward governor, Maxim silencer and Leece-Neville electric starter. Note Korfund vibro-isolators under steel frame.

Drawing of new terminal building at Moisant International Airport, New Orleans, La.



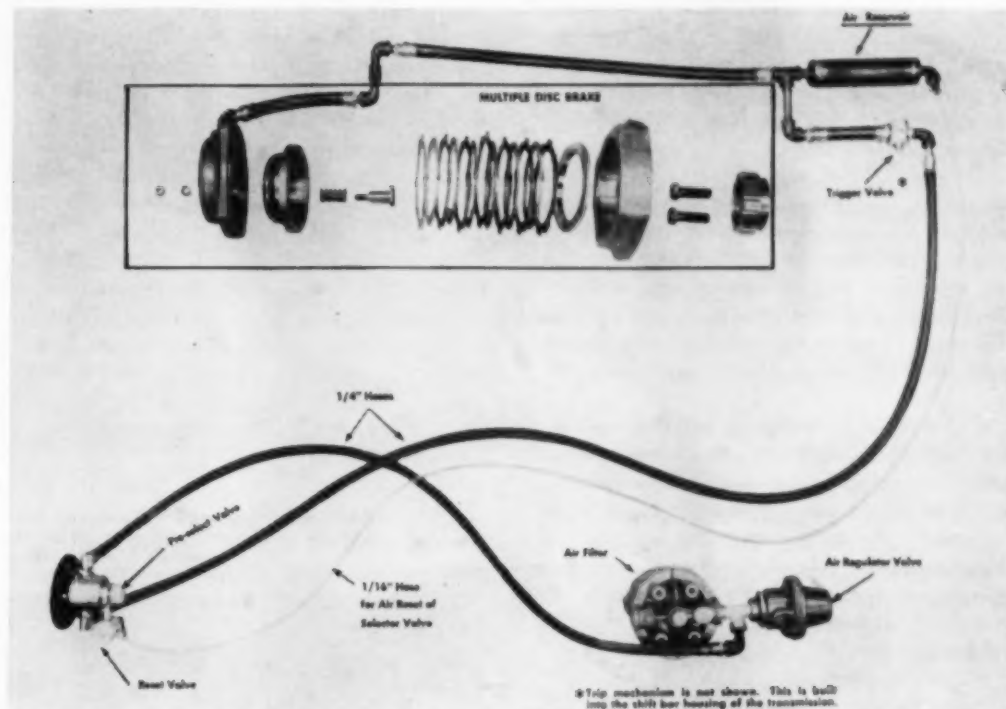
AIR-POWERED INERTIA BRAKE

New Fuller Development Eliminates Double Clutching and Is Standard on All Heavy-Duty, Off-Highway Transmissions; Air Actuated Shift Control Applied to Three Additional Transmissions

AN air powered countershaft inertia brake designed to permit fast, easy up-shifts without double clutching has now been incorporated as standard equipment on all Fuller transmissions built for heavy-duty, off-highway service. In addition, Fuller has announced that Fullair Control, the all-air actuated gear shifting control unit, is now available on three additional heavy-duty transmissions built by the firm.

Looking at these individually, the countershaft inertia brake according to Fuller was developed to give more efficient utilization of equipment, faster work cycles and reduced driver fatigue. Pre-selected by the operator simply by pressing a button, the countershaft brake slows the rotation of the transmission countershaft, main drive gear and clutch driven plate or plates. Actuation is automatic as the transmission is shifted through neutral, and, because there is no need for the operator to double clutch, deceleration of the vehicle is held to a minimum. The brake system provides a time cycle of 2/10 second during each application. At the end of this time the brake system is exhausted and pre-select valve (note schematic illustration) automatically resets for further use.

The operator's procedure during up-shifts is as follows: press button on pre-select valve; depress the clutch pedal; shift to neutral and pause momentarily; shift into the next higher gear and re-engage the clutch. Fuller points to the following precautions when using the inertia brake: use it only on up-shifts; shift progressively without skip-



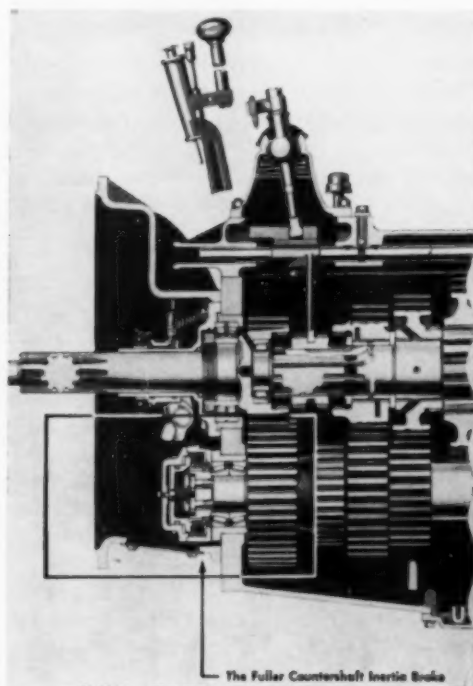
Schematic diagram of Fuller air-actuated countershaft inertia brake.

ping ratios; pause in neutral; and do not double clutch while shifting gears.

Air Actuated Shift Control

The Fullair control, announced and described in the May, 1956 issue of DIESEL AND GAS ENGINE PROGRESS, can now be obtained with Fuller model 5-C-72, 5-W-74 and 5-C-720 transmissions. It is also available with the 10-speed model R-63, RA-63, R-660, RA-660, R-96, RA-96, R-960 and RA-960 RoadRanger transmissions. Briefly the Fullair control replaces the conventional gear shift lever with a small master control mounted near the driver's right hand. Compressed air does all the work—movement of the lever through the normal shift pattern actuates valves which in turn

release compressed air to a slave unit on the transmission. The slave unit uses compressed air in power cylinders to engage the particular speed selected by the driver.



Cutaway view of flywheel end of model R-1350 RoadRanger transmission showing brake section and location.

Fullair master control for five-speed model C-72 and W-74 transmissions. An identical control, with different shift pattern, is used for Fuller 5-C-720 transmission which has an over-drive ratio in 5th gear.



EMERGENCY SET ASSURES INCINERATOR PLANT POWER

By ED DENNIS

THE influx of new residences and businesses, contributing to the rapid growth of the city of Hollywood, Fla., presented many new problems to the city fathers. Among those of a more urgent nature was the sanitary and economical disposal of an ever-increasing quantity of combustible garbage and trash.

An engineering survey revealed that disposal by incineration would provide the most satisfactory means of waste disposal for this growing city. A site was selected on the western edge of Hollywood for the new incinerator plant and construction begun. When it was completed, the municipality had a \$760,000 investment in the new plant.

The need for dependability of operation was obvious. Garbage disposal is a 24 hr. a day, year around job. Interruptions in this type of service are not only annoying but can endanger the health of the community. To assure continuous operation of the disposal plant, a standby emergency generating unit was incorporated in engineering plans to take over in case of failure of electrical power from the local utility company.

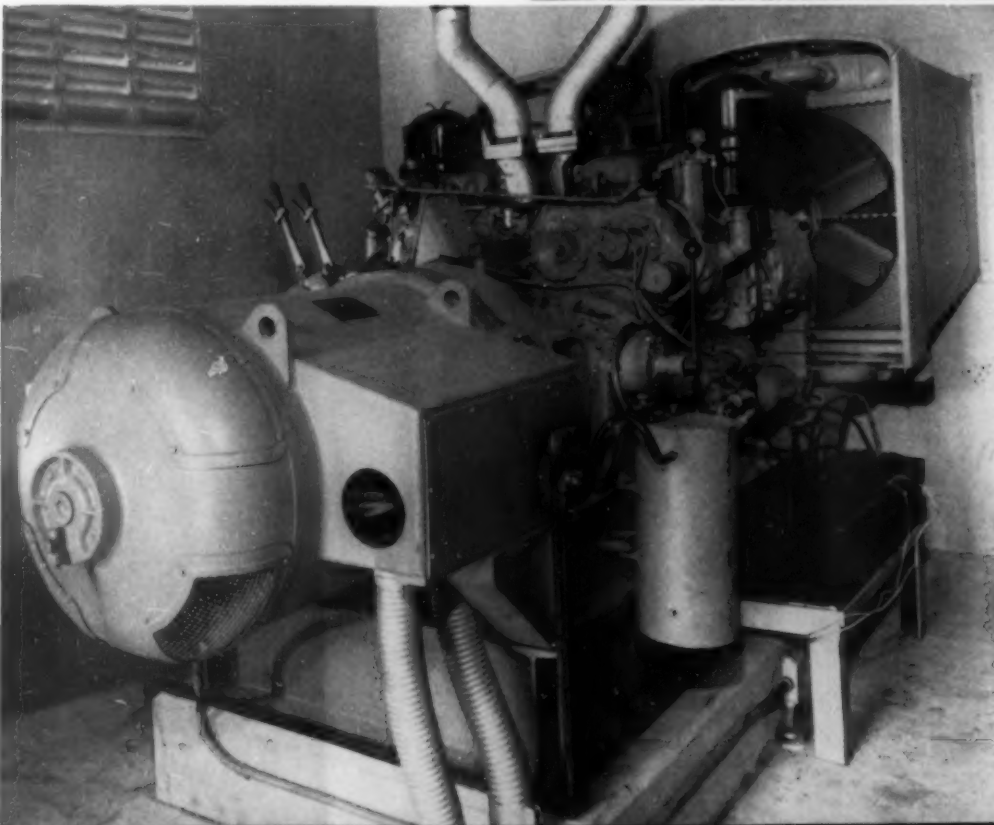
The standby set selected by the engineers is a GM Diesel twin 6-71 engine generating unit. This tandem arrangement of two 6-71 GM engines has a rating of 308 hp at 1800 rpm and weighs ap-

proximately 9000 lbs. The use of two engines driving one generator through separate engine clutches and a GM transfer gear box provides a good flexible unit. The two engines coupled to the drive shaft and individually clutched and throttled provide dependability. Greater economy of operation when only partial power is required is made possible because one engine may be shut down until load requirements demand use of both. The set is equipped with a Delco 276 kw, .80% P.F., 208/416-240/480 volt, 3 phase, 60 cycle generator. Also included are AC fuel oil and lube oil filters, four Donaldson air filters and two Woodward governors. The engine fuel oil is Standard No. 2, lube oil is Texaco No. 30. The set is also equipped with an automatic stop alarm for the lube oil system and cooling water and an over-speed shutdown device.

The general layout of the buildings was designed to blend in with surrounding terrain and the particular requirements of the city. Emergency generating set is housed in small concrete block building at left center, behind autos.



The GM twin 6-71 diesel engine setup. A Delco 275 kw, 208/416-240/480 v, 60 cycle generator is driven through individual clutches and a GM transfer gear box. Units are equipped with Woodward governors, AC lube oil and fuel oil filters. The set is housed in a separate hurricane proof building.



Starting is manual and the set can be on the line within three minutes of a power line failure. The unit is test-run each week for about an hour and since the plant went into operation in 1958 has been called upon to do a full load job three times, once for a four hr. period.

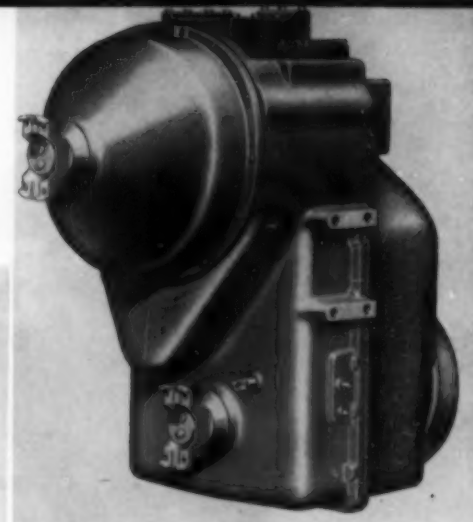
A total of 19 motors make up the load that the emergency generating set must carry. They range from 1/3 to 75 hp. Included are two charging door motors, 3 hp, 1740 rpm; two circulating pump motors, 30 hp, 1750 rpm; two stoker motors, 7.5 hp, 1740 rpm; two conveyor motors, 2 hp, 900 rpm geared down to 25 rpm at the conveyor; two motors driving American CMF56000 furnace blower fans; two 75 hp motors; one high pressure blower motor, 60 hp, 1800 rpm; two Fairbanks-Morse induction motors for water pumps, 25 hp, 455 rpm full load; two fan induction motors, 5 hp, 860 rpm and two 1/3 hp motors for pumps that spray fuel oil onto wet garbage to support combustion.

Hollywood, is located 17 mi. north of Miami in the heart of the famed "Florida Gold Coast". Statistics reveal the population is about 41,000 persons. Forecasters predict the population will reach the 100,000 mark 10 years hence. Primarily

a tourist city, it has almost 12,000 homes in the \$10,000 to \$200,000 bracket plus many motels and hotels dotting its golden beaches. In 1958 the city's valuation was over \$121 million. In the industrial area of the city are about 115 small, clean plants.

Many previously untried features in the field of municipal incineration are included in the construction of the smoke-free plant and engineers from throughout the world have spent considerable time looking at the modern installation. The plant has a designed capacity of 450 tons for a 24 hr. day. Presently the furnaces handle a daily average of 120 tons during the winter season with the daily load sometimes reaching as high as 160 tons. It can burn almost any combustible garbage material with a moisture content of up to 40 per cent. When moisture content exceeds that figure a small amount of fuel oil is used to help burn the material. The plant has a time cycle of about 10 tons per unit per hr. to unload, burn and load the residue from incineration on the truck.

POWER SHIFT 160 HP TRACTOR SHOVEL



Rockwell-Standard BDB transmission has full disconnect that provides four combinations of split drive.

Trojan 304 at work with GM 4-71 diesel supplying power.

ONE of the latest additions to the Trojan line of tractor shovels is the model 304, a 3 cu. yd. capacity machine with four-wheel drive that weighs 27,400 lbs. Built by the Trojan Division of Yale & Towne Manufacturing Co., the new 304 is available with a Cummins JS-6-B1 diesel or a GM 4-71 engine. The unit illustrated is equipped with a Rockwell-Standard full power shift, four-

speed transmission and a 3.0 to 1 torque multiplying torque converter. The transmission has a full output shaft disconnect for application flexibility and safety. The travel speed ranges from 3 mph in low gear to 25 mph in fourth gear in both forward and reverse. Full planetary double reduction axles are used on the 304 with Rockwell-Standard's PR and PS-300's being standard.

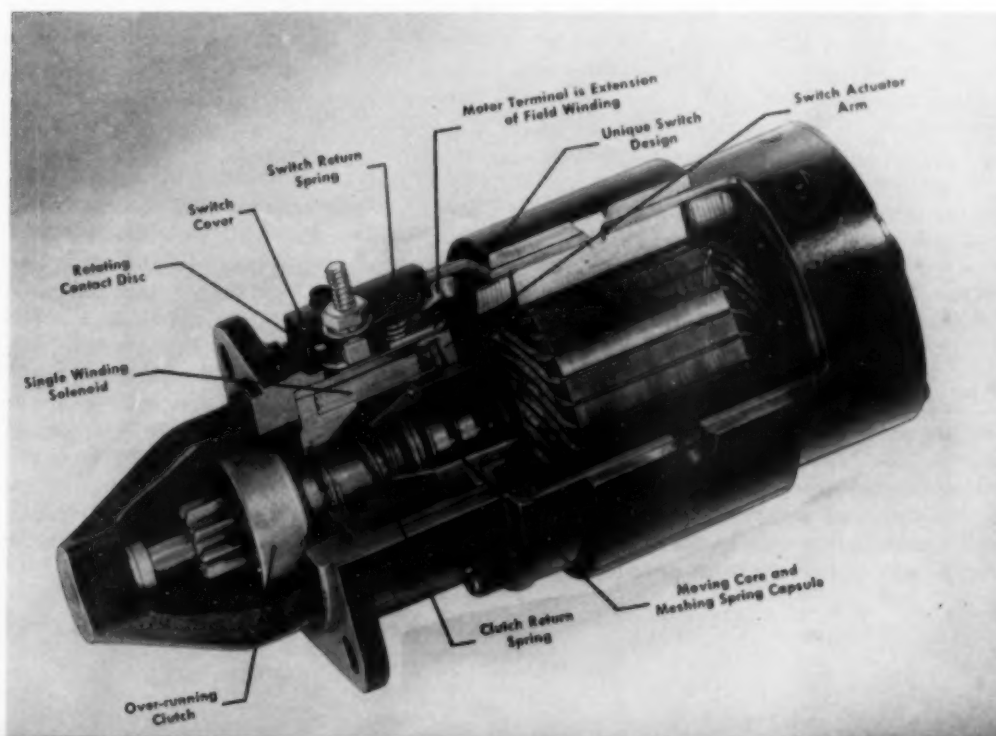
For maximum operator efficiency, the new Trojan is equipped with a panoramic instrument panel, four-wheel power brakes and dual cylinder hydraulic power steering. The 304 has a dumping clearance of 11 ft., 8 in. under the hinge pin, and 9 ft. under the bucket cutting edge. At this point there is a dump angle of 54° providing for fast, full clean-out of the bucket.

CO-AXIAL SHIFT SOLENOID STARTER MOTOR

A NEW positive shift starter motor design has been developed by The Electric Auto-Lite Co. in which the shifting solenoid is located inside the pinion housing co-axially with the shaft. Built for either 12 or 24 volt systems, the new motor has standard SAE mounting dimensions and is available in three different frame lengths and two diameters: 4 $\frac{1}{8}$ x 7 in. for diesels in the 200 cu. in.

class; 5 $\frac{1}{8}$ x 7 $\frac{1}{4}$ in. for diesels of 200-300 cu. in.; and 5 $\frac{1}{8}$ x 8 $\frac{5}{8}$ in. for diesels of 300-600 cu. in. The one-piece pinion housing is so designed that a flat for the terminal and switch can be machined at any point around the circumference of the housing resulting in unlimited mounting positions. When installed, the shifting mechanism is completely enclosed in the housing.

A single winding solenoid coil has been utilized in the new motor and according to Auto-Lite requires only 24 amps during shift. The switch is isolated and located in a protected area, accessible by removal of the cover. Resting in a notch in the solenoid structure is the switch actuator arm which rotates about the notch when triggered by a pin on the moving core. This rotation causes the freely rotating contact disc to move to bridge the terminals twice as fast as the velocity of the moving core. The shifting mechanism consists of the solenoid, a pre-loaded meshing spring capsule and an over-running clutch. When the solenoid coil is energized, the core forces the clutch and pinion towards the ring gear. If the pinion gear teeth should abut the ring gear, the meshing spring is compressed as the core continues to move forward. Just before the core completes its stroke, it actuates the switch, and the motor begins to rotate. As the pinion rotates into meshing alignment it is accelerated into engagement by the compressed spring. When the solenoid is de-energized, the switch is opened by the return spring.



New Auto-Lite starter motor. Single winding solenoid coil incorporated in new design requires only 24 amperes during shift. Motors come in 4 $\frac{1}{2}$ and 5 $\frac{1}{8}$ in. diameters, 7, 7 $\frac{1}{4}$ and 8 $\frac{5}{8}$ in. frame lengths.



DIESEL SERVICE PROGRESS

A COMMENTARY BY GEORGE R. MACKEY

George R. Mackey was long associated with Detroit Diesel Engine Division of General Motors Corp., and had prior experience as a mechanic in Europe and the U.S.A., which enabled him to become well acquainted in the diesel and service fields and to obtain a broad scope of the service industry from the customer's and management's viewpoint. Further training at Carnegie Tech and in the Army Ordnance during World War II provided the necessary requirements in planning service programs. Progressive advancement in diesel service areas in General Motors and with Detroit Diesel led to his position as Supervisor of Service Promotion. Upon termination of employment with General Motors in 1952, he joined Clayton Manufacturing Company, and his present position with this organization is Sales Manager of the Dynamometer Division.

1960 Diesel Service

SINCE introduction of the diesel engine shortly after the turn of the century, and the acceptance of this new form of economical power by the transportation industries during the 1930's, use of the diesel engine and growth of its service industry has progressed steadily. This acceptance can be readily recognized when we consider what has happened with the railroads. While the smoking, snorting steamer may bring nostalgic memories to many of the old time steam engineers and the youth of that era, the railroads were fast in recognizing the many benefits of diesels over steam power. There are no reports of any steam locomotives purchased by railroads since 1945, and today there are only 518 steamers in daily operation. Dieselization of railroads in a little over 25 years has resulted in the current use of more than 60,000 engines, developing over 73,000,000 hp.

Other industries have likewise recognized the many benefits to be realized from diesel engines. In the truck industry, there are more than 190,000 engines currently in use, developing more than 26,000,000 hp. The power demands in the construction field have led to a fast change-over to diesel engines, and in this industry today there are at least 400,000 engines developing upwards of 46,000,000 hp. The safety, dependability, and economy of the diesel engine has resulted in its acceptance as the chief means of power by the mining, petroleum, marine, and agricultural industries. Today, for most all of these industries, there are more than 2,000,000 diesel engines, developing in excess of 400,000,000 hp. During the coming year, we can safely predict an additional 230,000 engines, developing more than 28,000,000 hp to be added to these totals. Therefore, by the end of 1960, we can expect at least 2¼ million engines in operation. All of these engines will require planned service to maintain the 430,000,000 hp they can produce.

By analyzing this diesel population in terms of horsepower, we can easily establish a realistic need for planned, first-class service. For example, if through improper service the fuel consumption

rate for the total hp developed by all engines was one-tenth of a lb./hp hr. above that specified, the increased fuel consumption would be a fantastic 5,312,500 gph,—or 1,062,500,000 gals. per yr. This unnecessary waste would cost the industries more than \$200,000,000 annually. Therefore, the need for proper maintenance and service is evident, and the contribution of service to the operating economy of diesel engines will justify the expenditures for all types of tools and equipment to be sure all repairs are performed correctly the first time.

The service potential in this great industry is as fabulous as the growth of the industry itself. Retail service operations, properly organized to handle their service potential, will be influential in the purchase of 230,000 engines while participating in a multi-million dollar service potential. Based on averages for many industries, the total service volume brings to light stupendous figures. For example, the construction and mining industries will be required to overhaul close to 400,000 diesel engines during the coming year. This will demand at least 37,000,000 hrs. labor, and parts purchases close to \$500,000,000;—the agricultural industry will overhaul at least 190,000 engines, requiring upwards of 10,000,000 hrs. labor and an expenditure for parts close to \$120,000,000;—the trucking industry will overhaul at least 160,000 diesel engines, utilizing more than 15,000,000 hrs. labor and parts purchases in excess of \$200,000,000;—the transportation industry, both city and inter-city bus operations, will be required to overhaul more than 50,000 engines requiring 5,000,000 hrs. labor and parts purchases of approximately \$60,000,000. The engine overhaul service for most all industries for 1960 will total as follows:

Engine Overhauls	Labor	Parts
983,000	112,000,000 hrs.	\$1,250,000,000

The unnecessary expenditures from this tremendous potential are equally as staggering as the growth in this service volume. Surveys made on a large number of diesel service shops in the truck-

ing and construction industries, including independents and franchised dealers, show that at least 1½ service jobs are required for each engine overhauled. These service jobs require travel for many types of engine applications, either by the servicing organization or the end user. While a truck owner may be required to return to the service shop to have "do-over" work performed, a service organization may be required to drive 200 mi. to perform this "do-over" service on a pumping engine, shovel engine, and many others. By estimating a mere cost of \$50 for each of these "do-over" jobs, it will require \$75 for each overhaul, or a total of \$73,000,000. This total cost is a direct reflection on the service industry but it can be an equally costly waste on the engine owners and the productivity of their engine applications. If each "do-over" job required only 5 hrs. labor, the total engine downtime could easily total more than 6,000,000 hours.

Diesel service during 1960 can be lucrative for the retail organization, and profitable for the owner-owned establishments. However, unless proper steps are taken to assure the expected high quality workmanship, the results can be disastrous. Retail operations may finish the year showing a deficit instead of the profitable goals set forth; owner-owned operations may easily have the entire productivity of their business affected unless the service operation is well planned.

Service during 1960 will result in many changes from past procedures by operations intent on doing their share in this multi-million dollar industry. New types of equipment to reduce man hours per overhaul will become more popular in a great many shops. Many will incorporate programs to give more effective quality control. During this coming year, the "screw-driver and plier" types of operations will not even enjoy the service volume of preceding years, but the well equipped shop will experience greater volume, increased productivity and even larger profits than in the past. These modern shops will obtain an enviable position in the diesel service industry and will participate in servicing 400,000,000 diesel hp.

AiResearch Executive Appointments

The appointments of Jack Wright as assistant manager of The Garrett Corporation's AiResearch Industrial Division, James Hardy as sales manager and Jack Marinick as controller have been



Newly appointed executives at AiResearch Industrial Division. From left are Jack Marinick, controller; Jack Wright, assistant manager, and James Hardy, sales manager.

announced by Wilton Parker, division manager. Wright transferred from Mineola, N.Y., where he was manager of Garrett's Aero Engineering Division for the past 2½ years. He had been with Aero Engineering since April, 1943, other than time out for World War II service. Wright replaces Richard Gunter, who was appointed manager of cost control planning in The Garrett Corp. treasurer's office. Hardy joined AiResearch Industrial two months ago as assistant to the division manager, before receiving his present appointment. Previously, he was employed for 15 years by the Schwitzer Corp., where he reached the position of executive engineer. Hardy succeeds George Bransom who was transferred to The Garrett Corp. sales staff. Marinick has been in the Garrett organization for four years, previously working at the positions of general auditor in the corporate finance office and general supervisor of accounting at the AiResearch Manufacturing Division of Los Angeles.

New Oilfield Service Boat

A versatile oilfield service vessel, specializing in wireline operations, will take to the rig-clogged waters of Lake Maracaibo. It will fly the colors of Fra-Sar de Venezuela.

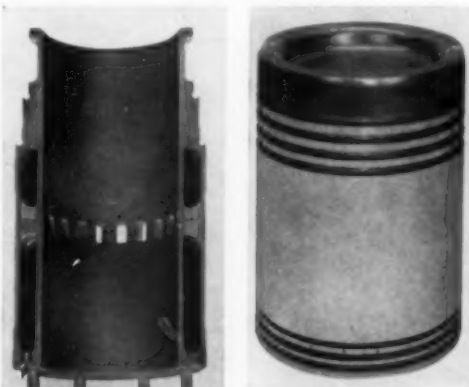


Stewart & Stevenson Services, Inc., handled the entire project on a turn-key basis, including design and construction of the vessel's wireline unit. The Bebette, big sister to the Monica No. 1, is being finished at the Breaux Shipyard near New Iberia. Harold R. Franzmeier, president of Fra-Sar who with his partner, E. L. Sartain, originated the "launch concept" for marine wireline service, said the vessel will provide perforating and neutron/gamma ray logging, in addition to other services. The steel-hulled Bebette has a 16.6 ft. beam, is 57½ ft. long and will have a cruising speed of about 20 mph. Two GM Diesel 8V71 marine en-

gines provide the prime power for the Bebette's twin screws. These engines also provide power for the hydraulic system which operates the wireline. The wireline operator will not have to leave the launch to conduct wireline operations on Lake Maracaibo wells. The launch ties up at the platform and a rig man gives signals from the derrick floor to the operator on the launch. The normal system for marine wire line servicing in the lake is through the use of barges. With the Fra-Sar technique, however, the speedy service vessel can get to any rig in a short time, complete the job, and then return quickly to shore or another platform.

Liner Plating Bulletin

A bulletin outlining its process of chromium plating engine cylinder liners with a patented Honeychrome-Matte finish is available from the Chromium Corporation of America. The firm's Crodon-plating process is said to combine wear resistance with impressive resistance to corrosion. The process is reported to allow significant savings through lower inventory requirements when use of oversize liners and parts is eliminated by reclamation at the size and tolerance of manufacturer's new liner



Left, the Honeychrome-Matte pattern throughout the bore of a type 367 EMD diesel engine cylinder liner and the dull texture of the Matte finish are discernible in this cross section. The Honeychrome finish is said to remain essentially unaltered throughout the effective life of the liner. Right, piston for Fairbanks-Morse type 38 engine, chromium plated to thickness of .005 in. on the crown and tin-plated to .002-.003 in. on the outside diameter of skirt and ring carrier section.

equipment. The Honeychrome-Matte process puts two separate patterns on the surface finish of the liner. The fundamental Honeychrome pattern is a geometric arrangement of cups etched to a highly controlled depth in the chromium of a cylinder wall, depending on the thickness of the plating. The deeper cups occur in a belt extending downwards from the circle of top ring reversal. During engine operation cups become reservoirs of lubricating oil.

The Matte pattern is a random, microscopically toothed texture superimposed on the Honeychrome formation. Piston rings, bearing on the toothed matte finish of the chromium, accommodate the surfaces to each. This wear, amounting to only fractions of a thousandths of an inch, is sufficient to seat the rings and wear away the toothed effect during the initial ring seating period. As the toothed effect disappears, rings become seated on a dense, stable chromium which substantially les-

sens wear on both bore and rings. As operating hours accumulate the system of Honeychrome cups does not become obliterated, rather it remains nominally fixed in its pattern. Bulletin 43 describing the Honeychrome-Matte process is available from Chromium Corporation of America, Rahway, N.J.

(ITS NEW)

Fairbanks-Morse Opens New Research Development Center

Separating its industrial research from manufacturing processes, Fairbanks, Morse & Co. recently opened its new corporate Research and Development Center and laboratory at Beloit, Wis. Robert



W. Kerr, president of Fairbanks-Morse, said the center is a "major part of our long-range planning program which aims to maintain Fairbanks-Morse's position in the fields it serves. Alfons Landa, chairman of the board of Fairbanks-Morse, stated that the research budget of \$1,500,000 for 1959 will be increased to \$2,500,000 for 1960. The new research center will serve other companies through which Fairbanks-Morse is affiliated in the Fairbanks Whitney Corp., David Karr, president of Fairbanks Whitney, said. Officials pointed out that the opening of the center means a change in the organization of research at Fairbanks-Morse. In the past, the new product development has been carried out by members of the development engineering staffs in the different factories. Research will be the full-time job of the scientists and engineers at the Center.

Brief talks at the dedication were made by David Karr, president of Fairbanks Whitney Corp. of which Fairbanks-Morse is a major component; Alfons Landa, chairman of Fairbanks-Morse, and Gordon R. Anderson, vice president and general manager of the Beloit Division. Beloit is the site of the largest Fairbanks-Morse plant. Mr. Anderson was vice president engineering of Fairbanks-Morse when the decision to establish the center was made. The center is now responsible to Walther C. Fischer, director of engineering. The center has accommodations for a research staff of 30 to 50 scientists and engineers, for supporting personnel such as draftsmen and technicians, and for a technical library. Usable space covers 20,000 sq. ft. The full-time research opportunities which the new Center provides are essential to the present period of industrial development, according to Walther C. Fischer, the director of engineering. The scientific and engineering staff should reach its contemplated size of 50 in the course of the coming year. At present only a nucleus of this number has been assigned to the job. With other research centers at Kansas City and Albuquerque, the researchers in Beloit will service the four product divisions of Fairbanks-Morse at Beloit; Freeport, Ill.; Kansas City; and Fairlawn, N. J., including the eight factories which make up those divisions.



WHAT'S GOING ON IN ENGLAND

CONDUCTED BY BERNARD W. LANSDOWNE

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as a former editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C. Ltd., Southall, following which he served some five years with that company's sales engineering department. He is now manager-for-the-United Kingdom of a group of business and technical publications.

New Leyland 4 Cylinder Unit

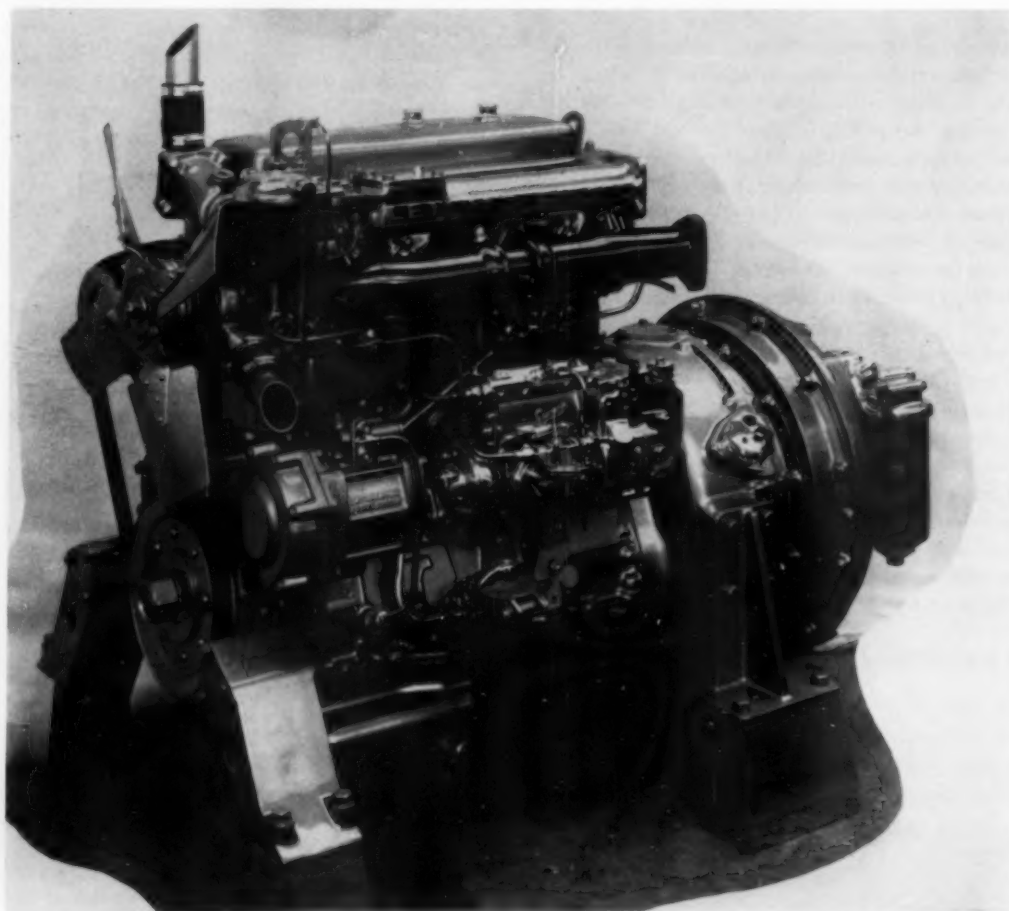
A NEW 4 cylinder direct injection diesel engine primarily for industrial service and with a 12 hr. rating of 61.5 bhp is announced by Leyland Motors Ltd. The peak rating for this unit for short duration industrial applications is as high as 71 bhp at 2200 rpm while for continuous day and night running the output is 55 bhp at a speed of 1900 rpm.

The engine is based on a cylinder bore of 4.1 in. and a stroke of 4.75 in. giving a displacement of 251 cu. in. The crankcase and cylinder block are an integral unit in cast iron, similar material being used also for the dry type cylinder liners. These latter are prefinished, shoulder located and are a sliding fit in the cylinder block. The cylinders are closed at the top by a cast iron head covering all four cylinders. The design of head incorporates Valmet metal exhaust valve seat inserts which are shrunk in position and renewable cast iron valve guides. The inlet valve is of nitrided chromium molybdenum alloy and the exhaust valves are in silicon chromium alloy steel. They are push rod operated in the conventional manner from the camshaft of the engine.

The crankshaft is a nitrided alloy steel forging with integral balance weights and it is carried in five bearings 3.1 in. diameter of the steel shell lead bronze type with indium coating. Similar bearing are used for the crank pins which are 2.4 in. diameter while a phosphor bronze bush is used for the connecting rod small end.

The camshaft is a one piece steel forging carried in four leaded gun metal bearings of 2.1 in. diameter and is driven by a helical gear from the crankshaft through an idler gear. The aluminum alloy pistons each carry three compression rings and two oil scraper rings. They are retained by fully floating gudgeon pins retained by circlips.

A gear type pump provides pressure lubrication at 60 to 70 psi. Pressure oil being supplied to the main and crank pin bearings, timing gear, camshaft and valve gear. The water pump is of the centrifugal type with self-adjusting carbon gland, it is belt driven. The fuel injection system includes Simms injection pumps and Leyland remote seat multihole injectors. A mechanical all speed type governor is integral with the injection pump and



➤ New four cylinder Leyland diesel engine. For industrial uses, Rockford, Twin Disc or Anderton power take-off units are available.

other standard equipment includes an air cleaner, starter motor and dynamo, a fan, flywheel housing and flywheel. The complete engine with all equipment weighs 920 lb. in the dry condition.

View of new Leyland industrial diesel engine showing starter motor and generator mounting. Engine has cont. rating of 55 hp at 1900 rpm. ➤



Florida Diesel News

By Ed Dennis

MAT Antz, southeastern regional sales engineer for American M. A. R. C., announces that the following dealerships have been set up in Florida: Vans Diesel Sales & Service for Dade and Monroe Counties, Ellis Diesel Sales & Service for Broward County, Marine Engine & Equipment Co. for Palm Beach County and Gulf Coast Engine Sales, Inc. in the Tampa area.

FROM Man-o-War Cay, in the Bahamas, the motor sailer *Lugger* to be repowered from gasoline to diesel with a General Motors 3-53 marine diesel engine and 1.5:1 Borg-Warner hydraulic r&r gears. This three cycle diesel is rated 86 shp at 2800 rpm. Jaywood Lukkins is the owner and Ellis Diesel Sales & Service of Fort Lauderdale did the engineering.

ALLIS-CHALMERS dieselized equipment being used close to Whitehouse on the new highway near U.S. 90 included a HD14, HD15 and a HD20 crawler tractors plus the big HD21 tractor powered by an Allis-Chalmers turbocharged model HDT844 rated 225 hp at 1825 rpm with hydraulic torque converter and hydraulic steering controls. H. E. Wolf is the contractor and C. M. Lance the sub-contractor.

THE 63 ft. yawl *Good Hope* of Ft. Lauderdale battled high winds and rough seas plus 29 rivals to win the Miami-Palm Beach yacht race. Auxiliary power for the craft is provided by a model X four cylinder 68 hp Ford diesel engine and 1.5:1 Paragon r&r gears; marined by Modern Diesel Power of Tampa.

OVER at Port Charlotte, Hooper Construction is using five DW21 two wheel Caterpillar tractors powered by 300 hp turbocharged six cylinder Caterpillar diesel engines to pull #470 (25 cu. yd.) scrapers on the Mackel housing project plus other "Cat" dieselized equipment.

Diesel Motors Sailors of Fort Myers built and sold a motor sailer to Mr. N. L. Randall of Fort Myers and powered it with a Mercedes Benz model OM636 diesel engine, 36 hp at 3000 rpm and Paragon 3:1 r&r gears.

GM dieselized equipment which moved into the state recently included a model 3-71 in a American #195 dragline for the S. R. D. at Panama City and a similar model in a L. S. 78 Link Belt Speeder crane for Edwin Mattson Jr. of Mascotte plus a 138 hp GM in a model D Le Tourneau-Westinghouse Turnapull for Harper Bros. working near the Caloosahatchee River at Olga.

AT Maderia Beach, the *Last Chance*, a 30 ft. snapper fishing boat, owned by Harveys Sea Foods, was repowered by a pair of model X four cylinder 68 hp Ford diesel engines and Paragon 2:1 r&r gears to turn 20x20 propellers. These Ford diesel engines were marined by Modern Diesel Power Co., Tampa.

A model 45 Allis Chalmers motor grader powered by a six cylinder 120 hp Allis Chalmers model ADS 516 diesel engine to F. A. Chastain Construction Co., North Miami Beach.

AT Tampa, Cone Bros., is working a model 280 Michigan tractor dozer powered by a NTO6BI Cummins turbocharged diesel engine rated 262 hp at 2100 rpm, Clark 3.0:1 torque converter and Clark four speed full reversing transmission plus Fram lube oil filter and a Perry filter for the water cooling system.

FLORIDA-Georgia Tractor Co., at Tampa, delivered to Mackel Development at Port Charlotte, two #118 Galion Grade-o-Matic scrapers powered by four cylinder UD525 International diesels rated 115 hp with manual gear shift transmission.

FROM Simplex Sales of Miami, for West End, Bahamas, three Waukesha Enginators powered by model 197DLCs Waukesha diesel engines each rated 95 hp at 1800 rpm and 45 kw Electric Machinery generators.

THREE S12 hydraulic scrapers, 12 yd. capacity, powered by GM 6-71 diesels (218 hp) Fuller 5F1220 transmission, Lipe-Rollway clutch, being used by Rock Products at Fort Lauderdale.

EDWARD Parkinson Co. of Coral Gables has been appointed distributor for Florida for the Lathrop marine diesel engines manufactured by the Burmeister & Wain American Corp.

THE S. M. Wall Construction Co., in building a 10 mile highway near Archer recently, used two model 210 Michigan tractor scrapers (19 yd.) powered by Cummins NTO6BI diesels (262 hp at 2100 rpm) and Clark 3.0:1 torque converters and transmissions for earth moving. These were pushloaded by a model 280 Michigan tractor dozer with similar power.

THE Tampa Tile & Terrazzo Co. received a 60 kw ac portable generating set powered by a model 516, six cylinder Allis Chalmers diesel engine rated a max 131 hp at 1800 rpm from Gulf Coast Engine & Equipment Co. of Tampa.

THE *Gulf Queen*, a 68 ft. shrimp trawler, built by the Sunset Boat Works and launched for George Lipscomb, had a

Caterpillar D342-C turbocharged diesel installed for main propulsion. The 220 hp diesel drives a 50x38 four blade Federal propeller through 3:1 Twin Disc hydraulic r&r gears. Gibbs Corp. supplied the "Cat".

GM powered and working on the Caloosahatchee River, the 50 ft. dredge, *Caloosha*, has a twin 6-71 diesel to run the 12x10 Kansas City sand and shell pump and a 6-71 supplies power for the Dayton hi-pressure pump for sand agitation. The 33 ft. x 10 ft. dredge tender is also GM dieselized with Twin Disc 3:1 r&r gears. Fort Myers Dredging Co. is working the dredge.

FOR Cross Hill, New Providence Island, Bahama, a D315-G Caterpillar diesel engine, 91 max hp, to run a Gardner-Denver six in. water pump via a Caterpillar power take-off.

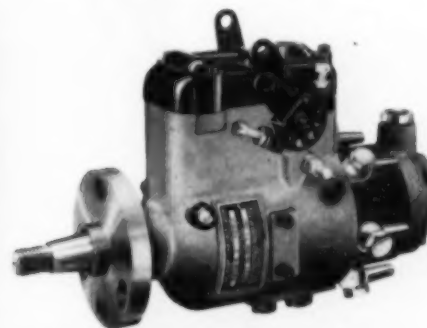
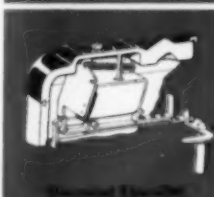
ELLIS Diesel Sales & Service of Fort Lauderdale has been appointed state

distributors for Nodorizer which, when used with Diesileen, is reported to eliminate diesel exhaust fumes etc., from diesel exhaust gases.

New Valve Division Manager

H. M. Reigner, sales manager of the aircraft division, has been appointed new products manager of the valve division of Eaton Manufacturing Co. at Battle Creek, Mich., it was announced by H. R. Johnson, general manager of the valve division. Mr. Reigner joined Eaton in 1949 as a sales representative in the valve division, working out of the Detroit office. Five years later he was transferred to the aircraft division as sales manager. Mr. Reigner will be responsible for the acquisition or development and sales of new type products, some of which may utilize the division's special skills in forging and welding stainless steel and super alloys. A native of Detroit, he attended the University of Detroit.

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versatility:



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Diesel engine manufacturers, their designers and engineers are specifying ROOSA MASTER because they know that it is the most versatile. There are many reasons for selecting this pump. Here are just a few:

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good
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HARTFORD MACHINE SCREW CO., HARTFORD 2, CONN.
DIVISION OF STANDARD SCREW COMPANY

Harbormaster Catalog

A new 2 page condensed catalog shows installations and features of Harbor-master outboard propulsion and steering units. Harbormasters are a complete marine power and steering package. Details, including a comprehensive table of specifications on 17 models from 40 to 500 hp are included. Write Murray

& Tregurtha, Inc., 80 Hancock St., Quincy 71, Mass.

ITS NEW

Marine Gears Bulletin

A six-page folder, Bulletin 319, giving comprehensive data about Twin Disc marine gears has just been issued by the Racine, Wis., firm. Fully illustrated, the bulletin contains information on Twin Disc engineering and production facilities

as well as quality control and testing procedures. Features common to all Twin Disc marine gears are covered at length. There is also a section devoted to Twin Disc's parts and service facilities. For a copy of Bulletin 319 plus engineering bulletins on any of Twin Disc's three marine gear models, write Twin Disc Clutch Co., Racine, Wis.

ITS NEW

Mid-West Diesel News

By L. H. Houck

INTERNATIONAL is shipping 392 TD-24 tractors to military establishments throughout the country from the Harvester Chicago Equipment Division. Thirty-five units are in use for training at Fort Belvoir Engineer School, of U. S. Army. The Army's Fourth Training Regiment, Fort Leonard Wood, Mo., was one of the recipients of the new shipment.

BORGER Industrial Engines Co., Borger, Tex., has been appointed Deutz engine center for the area by Marine and Industrial Engine Div. of Chrysler Corp.

MOHLMAN Diesel Sales, Hastings, Neb., has delivered an A12L-614 Deutz air-cooled diesel as a unit in a frame with a heavy-duty gravel pump connected to engine through a 3:1 Cotta reduction gear.

FIRST of 50 new stream-lined air conditioned GM buses have been delivered to PSC in St. Louis. Each bus is equipped with a V-6 GM diesel and cost \$31,500. Transmission is by Allison.

OSCAR Sellenrick & Associates, St. Louis, have taken delivery on an International HD-6 with Drott loader from Mo.-Ill. Tractor Co.

INTERNATIONAL TD-15 and Drott loader to Richard Harder, St. Louis, from Mo.-Ill. Tractor Co.

ANNA Quarries, Anna, Ill., a model HOD Hough loader with Hercules diesel and Hough TC from Mo.-Ill. Tractor Co., St. Louis.

INLAND GM Diesel, Inc., Milwaukee, sold and installed a 6-71 GM in a Klauer Sno-Go owned by Kenosha County highway department, replacing a gasoline engine.

F.W.D., Clintonville, Wis., has taken delivery on a 6V-71 from Inland GM Diesel, Inc., Milwaukee, for installation in an oil well servicing unit.

R. G. Brown Const. Co., Louisville, Miss., has 34 miles of Interstate 59, 2,633,000 cu. yds. excavation, NY to New Orleans route, and has added three International TD-24's and a TD-15 to its crawler fleet.

ERNEST R. Fyfe, Wakefield, Kan., used a TD-20 International crawler in his job near Junction City, Kan., furnishing aggregate for US 40 construction. He uses a UD-24 International diesel on a storage hopper mixer which loads sand and gravel mix into trucks.

A Mighty Tug ON A Mighty River!

The FLO W., owned and operated by Merritt-Chapman & Scott Corporation, was designed by the Marine Design Section of the Cleveland Diesel Engine Division of General Motors and built at Jakobsen Shipyard, Oyster Bay, New York.



Merritt-Chapman & Scott Corporation's tug, FLO W., was designed and powered with a 1600 SHP General Motors Diesel engine for heavy towing service. Since May, 1959, the FLO W. has towed heavily loaded scows at Merritt's Galop Island dredging project on the St. Lawrence River. This dredging project was the largest operation of this kind ever to have been undertaken in North America.

*For every kind of marine service where dependability is required,
General Motors Diesels are first choice.*



CLEVELAND DIESEL ENGINE DIVISION
GENERAL MOTORS CORPORATION
CLEVELAND, OHIO

SALES AND SERVICE OFFICES:

Chicago, Ill. New York, N. Y. St. Louis, Mo. Seattle, Wash.
New Orleans, La. Pittsburgh, Pa. San Francisco, Calif. Wilmington, Calif.

A GOOD PRODUCT PLUS GOOD SERVICE GIVES GOOD PERFORMANCE

OBSERVED: Caterpillar experimental 27 cu. yd. scraper on List & Clark's Tuttle Creek Dam job, near Manhattan, Kan.

MO-ILL. Tractor Co., St. Louis, delivered a TD-15 International with dozer to James Shipment, Bloomfield, Mo., for use in farm grading and terracing.

INLAND GM Diesel, Inc., Milwaukee, installed a 6-110 GM diesel in a Commander gravel plant owned by C. C. Linck, Beaver Dam, Wis.

ROCKHILL Quarry, St. Louis, International Hough loader from Mo.-Ill. Tractor Co., with Hercules diesel and Hough TC.

GM 6-71 to C & J Farms, Endeavor, Wis., for use in farm drainage work, from Inland GM, Milwaukee.

INTERNATIONAL TD-20 and Drott to J. & S. Sewer Const. Co., Overland, Mo., from Mo.-Ill. Tractor Co., St. Louis.

Mo.-Ill. Tractor Co., St. Louis delivered a TD-6 International with International diesel and Drott loader to Vester Sohn, St. Clair, Mo. for use in general contracting.

HARRY Nolle & Son, St. Charles, Mo., have added an International TD-6 and Drott to their fleet of construction equipment from Mo.-Ill. Tractor Co., St. Louis.

CUSTOM Dredging Co., LaCrosse, Wis., took delivery on a new 4-71 GM diesel fabricated to heat exchanger cooled unit for use with a dredge pump, from Inland GM Diesel, Inc., Milwaukee. Unit was assembled in Inland's shop.

Air-Maze Project Engineers

Four new project engineers have been added to the engineering staff of Air-Maze Corp., Cleveland. The four men are Robert V. Moser, Frank G. Likly, Frank C. Kunc and Harvey Braun. The announcement was made by R. E. Brown, chief engineer of the company. Air-Maze Corp. is a subsidiary of Rockwell-Standard Corp., Pittsburgh. Mr. Moser was formerly a sales engineer with the Hoist Equipment Co., and is a graduate of Heidelberg College. Mr. Likly was formerly a materials engineer at Jack & Heintz, Inc., and is a graduate of Case Institute of Technology. Mr. Kunc was formerly associated with Ford Motor Co., is a graduate of Baldwin-Wallace Univ. Mr. Braun was with American Steel & Wire Division, U.S. Steel, and attended both Case Institute of Technology and Ohio State Univ.

Endorses Diesel Courses

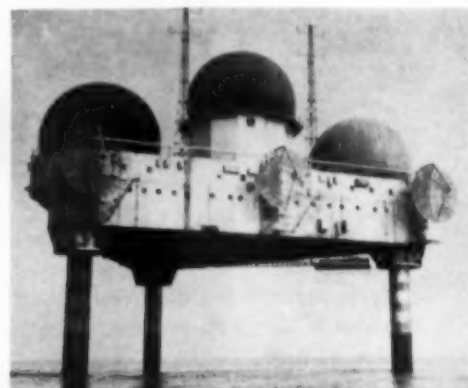
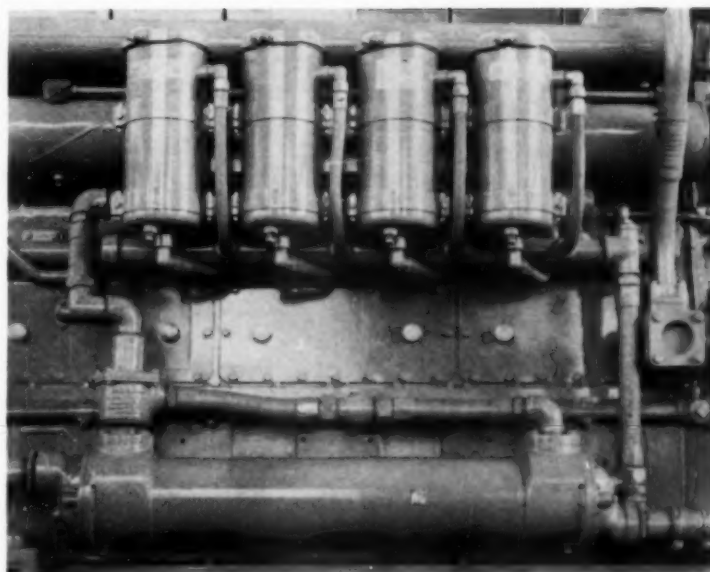
A series of diesel courses prepared by Interstate Training Service have been endorsed by The White Motor Co. for study by branch and distributorship personnel, according to T. W. Lauer, service manager for the Cleveland, Ohio heavy duty truck manufacturing firm. "Diesel trucks are now a large portion

of our production, and an increasingly large percentage of service sales will be diesel," said Lauer. The White Company's endorsement of Interstate's training programs comes after the Cummins Engine Co., Inc. authorized the school to prepare two courses on its diesel engines—Course 101, "Principles, Maintenance and Repair of Cummins Diesel Engines", and Course 201, "Cummins

Engine Unit Rebuilding." All present White Motor Company diesel trucks use Cummins power plants. Commenting on the two Cummins-approved courses, Lauer said, "The training service courses on Cummins diesel engines will provide mechanics with approved Cummins diesel training right on the job, and eliminate traveling and living expenses to attend various schools."

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Write for: "The Stirring Saga of Big Drip and Little Drip!" and their capture by the Winslow Boys!

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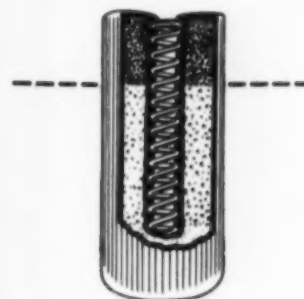
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Inland River Reports

By A. D. Burroughs

TWO Fairbanks-Morse OP engines, rated at 640 hp each, will power the new tug scheduled for Esso Standard Oil Co. The 85 ft. x 26 ft. tug will be delivered from the busy yards of Southern Shipbuilding Corp., Slidell, La.

SOUTHERN Shipbuilding Corp. has a construction order for four commercial-type VTB harbor tugs to be delivered in late 1960 and early 1961 to the U.S. Navy Dept., Bureau of Ships. The 135 ft. x 29 ft. twin-screw tugs will have a rated 1000 hp supplied from GM engines.

A pair of Cooper-Bessemer engines will

supply a rated 2400 hp converting the *Bob Denniston*, a long-time steamer, into diesel service for the Whiteman fleet at Gretna, La.

NORBROCO, new twin-screw towboat for Norman Brothers, Alton, Ill., is in service with 800 hp provided by the two Cummins VT-12-M turbocharged engines. The craft is a recent production from the Barbour Metal Boat Works, St. Louis.

OWENSBORO (Ky.) Welding and Construction Co. has completed the *Rebecca*. The 54 ft. x 16 ft. craft has a total 570 hp developed from two Allis-Chalmers diesel engines.

AT Pensacola, Fla., the Brown Marine Service completed and placed into service the towboat, *William E. Brown*. The 50 ft. x 16 ft. twin-screw vessel receives push-power from two Caterpillar engines rated at 600 hp.

whatever your Gear Problem... it will pay you to bring it to us

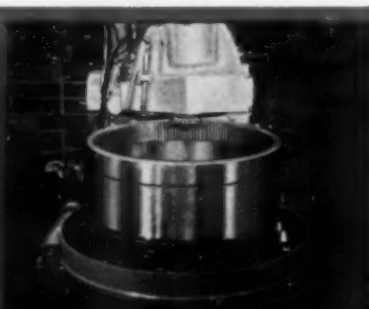
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Medium-sized hobbing machine cutting teeth in special crown gears



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Large hobbing machine cutting teeth of large pinion on 12 foot shaft



Large special 154" gear shaper cutting large spur internal ring gear for radar equipment



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CATERPILLAR is the power-choice for two vessels under construction at Cape Girardeau Sand Co., Mo. A 60 ft. x 15 ft. craft, tentatively named *Susan Kay*, is reported to be powered by a Caterpillar engine supplying a rated 325 hp. Two Caterpillar D342 engines, rated at 220 hp, will equip a 52 ft. x 15 ft. craft to be named *Capt. Dick*.

THE towboat *Jerry Bosworth* will ply the Ohio for Point Towing Co., W. Va., as a triple-screw craft. A center (third) GM engine installed by Marietta Manufacturing Co., gives a power boost to 790 hp from 580 hp.

SOUTHERN Towing Co., Caruthersville, is getting fine performance from their new fleet addition, the *C. B. Southern*. Built by Greenville Manufacturing Co., the 30 ft. x 100 ft. towboat has 1800 hp supplied from GM engines.

TWO GM engines equip the unusual utility boat, *Mobile Island*, supplying a rated 340 hp. The 48 x 18 ft. craft, completed by Humboldt Boat Service for Economy Boat Store, Wood River, Ill., is designed to meet the special functions of a mid-stream supply vessel.

A special thanks to a river-friend for the large photo of the Foss fleet, operating out of Seattle and Tacoma. The photo pictured some seven of the Foss workboats at work, all seven equipped with Enterprise engines.

THE M/V *Walter C. Beckjord* was in action with an enormous tow for owner Ohio River Co. Built by St. Louis Shipbuilding and Steel Co., this busy towboat has 3240 hp from Baldwin-Lima-Hamilton engines.

CONSIDERABLE interest centered on



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Get more starts, quicker starts, at lower cost with SPRAY STARTING FLUID. Both the fluid and propellant burn... there's no waste! Each pressurized can contains enough fluid for many starts... starts that will sustain combustion until a smooth running engine can take over. Our greater supply of "vapor pressure" at all temperatures, atomized at a high initial rate, shortens cranking and warm up time, reduces dilution, prevents electrical and starting system wear, saves wasted man hours and equipment down-time. SPRAY is atomized for safe application and quantity control... use only as much as the engine requires. Field-proven SPRAY STARTING FLUID will start the toughest engine down to 65° below zero... but for year 'round economy start engines every day with SPRAY! Sold through automotive jobbers everywhere.

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the elevator of the new towboat, *Girlie Knight*, a 156 x 35 ft. towboat recently completed by St. Louis Ship. Owned by Mid-South Towing Co., and powered for 3200 hp from Fairbanks-Morse OP engines, the craft's elevator extends from main deck to pilot house.

Nordberg Dallas Assistant

Appointment of Donald E. Byrnes as assistant sales engineer in the Dallas office was announced recently by R. W. Bayerlein, engine division vice president, Nordberg Mfg. Co., Milwaukee. Formerly an assistant in the sales department Byrnes' background includes training in diesel engine engineering as well as in the field on service and installation. In his new position he will assist M. R. Wall, district manager in the Dallas office, serving users of Nordberg engines for municipal, industrial and pipe line applications. The Dallas territory includes the northern two-thirds of Texas, Oklahoma and New Mexico. Prior to joining Nordberg as a sales assistant Byrnes spent three years as a student in training in the various diesel engine departments. A graduate of Marquette University he received a degree in Mechanical Engineering in 1958.

Filtration Equipment Distributor

The Eads Co., Houston, Tex., has been appointed to handle CFC Honan-Crane and Delpark Filtration Equipment for Commercial Filters Corp. Product line includes filters to provide micro-clarity for all types of industrial oils and other liquids. Shaw Engineering of Houston will continue to handle CFC Fullflo Filters.

New Coupling Catalog

The Thomas Flexible Coupling Co. announced issuance of Catalog No. 60, a modernized version of Catalogs 51 and 51-A. Coupling misalignment is described, the reader is assisted in selecting a coupling suitable for his requirements, loads are classified in a new way, and various types of couplings are grouped for easier selection. Photographs of couplings and installations, diagrams and tables for each type of coupling comprise the main part of the catalog. Many of the tables in the previous catalogs have been extended to include new larger sizes. New additions to the catalog include the line of miniature couplings which were formerly covered by a four-page circular. The new SERIES 33, SF, FMR, CMR and the extra high speed SERIES 50 and 51 are shown and described as standard couplings. New style applications and special couplings designed for specific conditions are also shown in the new No. 60 Catalog available from the Thomas Flexible Coupling Co., Warren, Pa.

ITS NEW

American Marc President Discusses Auto Diesel Outlook

The possibility that American automobiles might soon be powered by diesel engines was offered by a diesel engine manufacturer. W. Denis Kendall, president of American Marc, Inc., manufacturers of small lightweight diesel engines and diesel equipped marine pleasure craft, told a meeting of the New York Society of Security Analysts that "the economical operation and durability of the diesel makes it a 'natural' for taxis and utility trucks and any other conveyance that takes long and constant wear. And it will make the family car last six times longer than it does today." Mr. Kendall said the Inglewood, Calif., company was now developing a diesel in the 35-50 hp range which would first be produced as a marine motor, and later for cars. He said the engine "would be able to power cars up to 3,700 pounds, which includes most of the lower priced American cars, at speeds up to 75 mph." Mr. Kendall told the security analysts the company would be "reaching for" sales in the fiscal year ending next May 31 of approximately ten million dollars, and a net profit of "about eight per cent or better." The company is now in production of a line of dieselized marine pleasure craft, equipped with American Marc's single and twin cylinder, air and water cooled engines. On January 15, American Marc is scheduled to go into production of the world's first marine diesel outboard motor. (See Diesel and Gas Engine Progress, Nov. 1959) American Marc also manufactures generator sets for military and commercial uses. Mr. Kendall said that the engine the company now was developing would "bring the United States into competition with foreign manufacturers who have been attempting to grab off the lion's share of the huge potential automobile diesel engine business that exists in this country today." He said that the new diesel engine, weighing about 200 lbs., initially would be used to power cabin cruisers produced by the American Marc's marine division. It will be a single cylinder, opposed piston engine, water cooled and equipped with outboard drive. Kendall said that the engine would have additional application separately and in electric generator sets over a broad range of industry.

Tube Forming Brochure

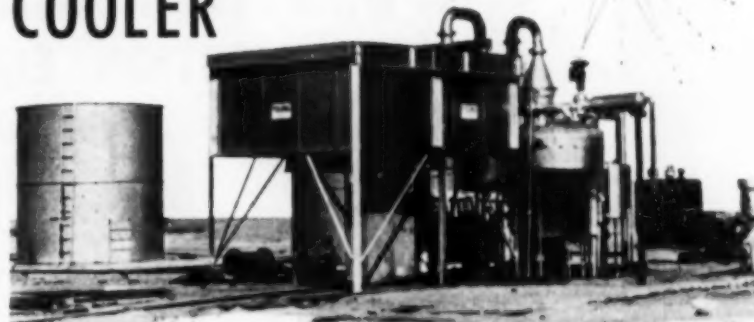
A new aircraft engineering bulletin covering engineering data and other important information on the fabrication of Tight Bend tubes has been announced by Aeroquip Corporation, Jackson, Michigan. The bulletin describes how these bends are formed through a cold process method to extremely short radius

bends of 1:1 ratio, or less. Wall thicknesses are controlled resulting in absolute minimum wall thin-out at the outside radius. The brochure is available from the Advertising Department, Aeroquip Corp., Jackson, Mich. Request aircraft engineering bulletin #25 (AEB-25). In Canada, write Aeroquip (Canada) Ltd., 287 Bridgeland Ave., Toronto 19, Ont.

ITS NEW

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Hercules Sales Appointments

Two key sales appointments have been announced by William F. Humphrey, director of sales, Hercules Motors Corp. John E. Scales, former chief engineer and sales manager of Frazier-Wright Company, Los Angeles, has been appointed district sales manager for the Pacific Southwestern area; and Robert S. Miller has become manager of oil-field sales. Mr. Miller majored in mechanical engineering at U.C.L.A., worked in sales and engineering positions for Buda engine distributors in California and the Mid-Continent and for Lufkin Foundry and Machine Co. in the Central states and the Rocky Mountain area. Mr. Scales, active in the oilfield, industrial and transportation en-



J. E. Scales

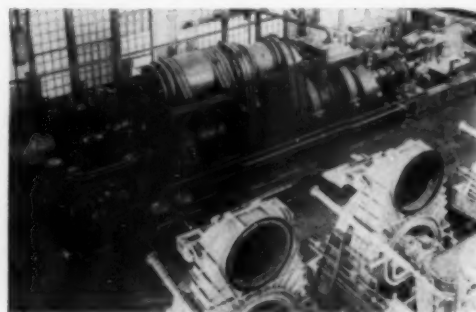


R. S. Miller

gine fields for many years and familiar with the special requirements of engines in Western applications will cover a territory embracing Arizona, California, Colorado, Nevada, New Mexico and Utah.

Clark Turbines to Power Venezuela Gas Project

Clark Bros. Co., one of the Dresser Industries reports acceptance of its model 302 and 305 gas turbines is keeping production moving at a brisk pace. Shown are several 8700 and 9300 bhp units on the Clark assembly floor in Olean, N. Y. Five of these dual-shaft turbines will be used by Shell Co. of Venezuela, Ltd. for its new gas injection



project on Lake Maracaibo, Venezuela, S. A. The units will be mounted on a platform over the water and will drive five Clark multi-stage centrifugal compressors. The entire plant, including two other Clark gas turbines and two Clark centrifugal compressors built in Italy by a Dresser A. G. licensee, is designed to handle approximately 190 million cu. ft. of natural gas per day.

Rockwell-Standard's Transmission And Axle Division Advances Two

The appointments of Kenneth M. Koch as director of engineering and Gerard J. Flannery as service parts manager have been announced by F. W. Parker, Jr., Rockwell-Standard vice president and general manager of the Transmission and Axle



K. M. Koch



G. J. Flannery

Division. Mr. Koch started with the company as a junior engineer in 1940, shortly after graduating from the University of Detroit. He has served successively as application engineer, assistant chief engineer and assistant general sales manager prior to his latest appointment. During World War II, he served as a captain in the Army Air Corps. He is a graduate engineer and an active member of the Society of Automotive Engineers. Mr. Koch's new position entails direction of all engineering activities at the Division's six plants which produce a wide variety of axles, transmissions and special drives for the automotive, agricultural and industrial markets. Mr. Flannery's appointment as service parts manager of the Division comes after service with the company dating back to 1940 when he started as an accounts payable clerk in the accounting department. He attended both the University of Michigan and the University of Detroit and was an officer in the U. S. Navy Air Force.

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Close Maintenance Watch Gives 98% Availability

Since going on the line in 1949, three big Worthington diesel engines have chalked up nearly 150,000 hours and have been available for more than 98 per cent of the time at Columbia Iron Mining Company, Cedar City, Utah. Key to this performance has been the comprehensive maintenance schedule maintained by J. R. Strate, maintenance superintendent of the power plant. Ten years ago the mining company, a subsidiary of United States Steel Corporation, placed into service a new diesel engine power plant at their open pit mines to supply power for expanding operations. The company's electrical engineers, knowing the severity of the electrical load—which varies from 0 to 850 KW, down to 250 KW, up to 600 KW, down to 200 KW and up to 1200 KW, all in a matter of seconds—determined that the most suitable primary power source for the electric shovels, churn drills and other electrical mining equipment would be diesel engines. Three 8 cylinder, 4 cycle, supercharged 600 rpm diesels were installed. Each engine develops 710 KW of full load rating, continuously, at an elevation of 6500 feet above sea level. The first seven years of operation the running-plant-capacity-factor (the average if expressed as a percentage of the full-load rating) was 57 per cent. During the past year this factor has increased to 60.5 per cent. The three engines have been operating almost continuously because of the fluctuating nature of the load. Every two years the engines are scheduled for a general overhaul if the condition of the engines requires. The last



One of three Worthington diesels which have given 150,000 hours of service at the Cedar City open pit mine of Columbia Iron Mining Co.

general overhaul was in October, 1956, and the next one was scheduled for early this fall. The top compression piston rings have been replaced at each general overhaul and all of the piston rings were replaced during the last general overhaul. Since the plant was started, only one liner has had to be replaced.

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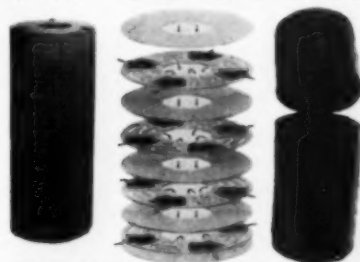


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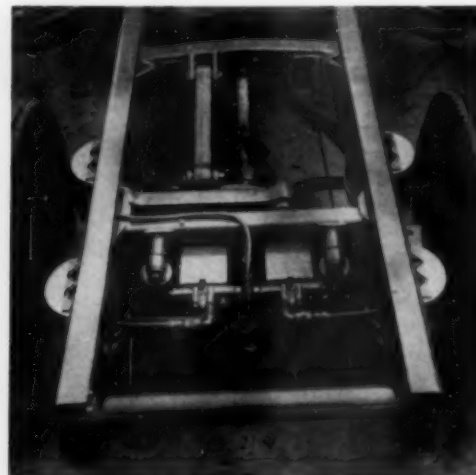
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White Air Suspension Tractor

White Truck Division of The White Motor Co. has announced a tractor which combines air suspension and fiberglass-cab design for highway transport. White is introducing the new air suspension on its 5400TD Series highway tractors, first in the industry to utilize fiberglass cab. The



View of air suspension on new White 5400TD tractor.

air-spring system will be on the single rear drive axle of the tractors. J. N. Bauman, president of The White Motor Co., and H. J. Nave, executive vice president of White Truck Division, said the new tractors utilize a "lobe-type" air suspension system developed for White by Clark Equipment Co. The suspension is lighter than spring types and, together with the weight-saving advantages of fiberglass cab and aluminum in some other components, helps the 5400TD increase legal payloads by up to 1350 lbs. Advantages of air ride are in cargo safety, increased longevity and less maintenance of equipment, and improved driver comfort. The air suspension system on the new tractor automatically adapts to varying trailer loads in absorbing road shock and producing uniform riding softness. Side sway on curves is virtually eliminated by means of a torsion bar running laterally across the chassis ahead of the drive axle and attached to the axle and truck frame by means of torque arms. Torque rods and arms also control the braking torque and axle alignment. White's new fiberglass-cab, air-suspension tractor has bumper to back of cab dimension of only 50 inches.

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DIESEL AND GAS ENGINE PROGRESS

Diesel and Gas Engine Progress Names New Associate Editor



Anthony A. Alberte

Appointment of Anthony A. Alberte as associate editor of DIESEL AND GAS ENGINE PROGRESS is announced by Rex W. Wadman, editor and publisher. Mr. Alberte will headquarter in the publication's main offices in Milwaukee. A 1950 graduate of Marquette University, Milwaukee, Wisconsin where he obtained a B.S. degree in Journalism, Alberte brings to the magazine an excellent background including wire service, newspaper, industrial publicity and magazine production experience. In his new position he will travel extensively in the midwest and coordinate the activities of the publication's field editorial staff.

Diesel Electric Ore Truck



Unit Rig & Equipment Co., Tulsa, Okla., has announced development and manufacture of a new 55 ton payload diesel electric ore truck for open pit mining and large-scale construction operations. Officials at Unit Rig say that the truck has been designed to cut haulage costs 10 to 30 per cent. The first truck has been purchased for use in the Mesabi iron range near Hibbing, Minn. The off-highway vehicle will incorporate the General Electric motorized wheel drive. Electric power for the motorized wheels is supplied from a generator driven by a Cummins VT-12 engine. Each wheel has its own integral electric motor and simple gear drive arrangement. The entire motor is mounted within the rim, which in turn is bolted to the side of the vehicle. Delivery of maximum engine horsepower to all wheels enables the truck to take steeper grades (up to 15 per cent), cutting haul length and reducing roadway maintenance expense. Motorized wheel drive eliminates the need for axles, transmissions, differentials, and

drive shafts, reducing over-all maintenance expense and down time. Dynamic braking on all four wheels, utilizing the full horsepower capacity of the wheel motors as generators, is another important feature of the ore hauler. The energy of motion of the vehicle is dissipated into air-cooled resistors during the braking cycle. Fully modulated braking control permits the operator to handle the fully loaded truck smoothly and easily throughout the entire speed range.

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SELF-POWERED, SELF-CONTAINED

All-in-one temperature control for lube oil or cooling water

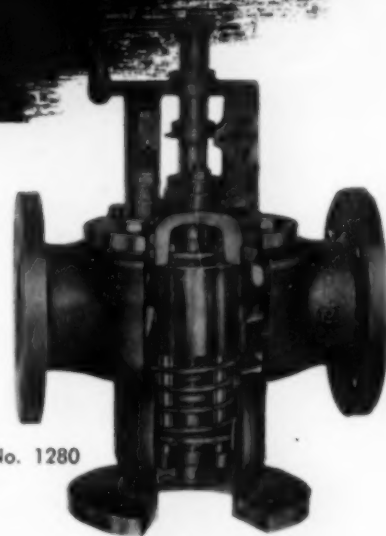
The patented Power-Pill® thermal unit in this economical Robertshaw Regulator responds instantly to temperature changes in cooling water or lube oil . . . and automatically operates to maintain the exact engine temperature necessary for best performance.

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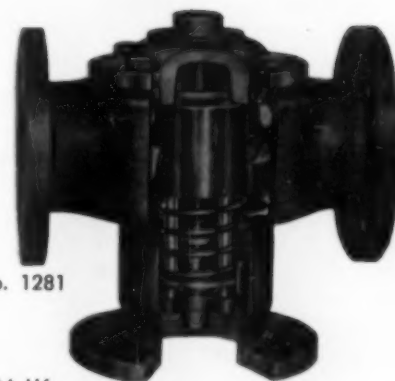
Available, in valve sizes 2" through 6", in two models as shown:

No. 1280—Manual positioner lead-sealed at the factory. Operates manually for emergency service, abnormal conditions, to override thermostat.

No. 1281 — Same basic unit, without manual positioner. Factory set, completely tamper-proof, more economical. **Fulton Syphon Division, Robertshaw-Fulton Controls Co., Knoxville 1, Tenn.**



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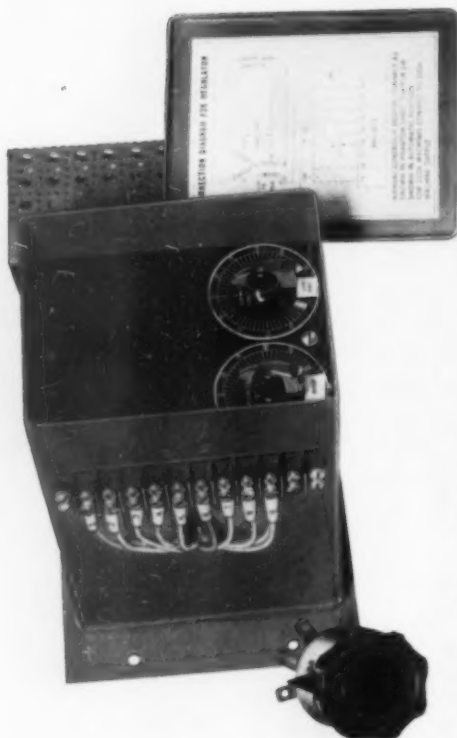
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The new Fincor F-26 Voltage Regulator is a completely static, magnetic amplifier controlled device which provides regulation of $\pm 1\%$. (Much closer regulation is obtained with most generators.) The compact, lightweight, Fincor F-26 has no tubes to fail... requires no warm-up time... is ruggedly constructed for long, trouble-free service under conditions of high shock and vibration. It is designed for use on 50-60 cycle generators or exciters requiring a dc field supply up to 1.8 amps at 125 volts or less. A field forcing relay for motor starting is available at a slight extra cost. For complete information, write for Bulletins 3200 and 3210.

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Other Fincor Voltage Regulators are available for use with generators needing up to 5 kw field power

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Roger Murray Heads Pacific Coast Fairbanks-Morse Region

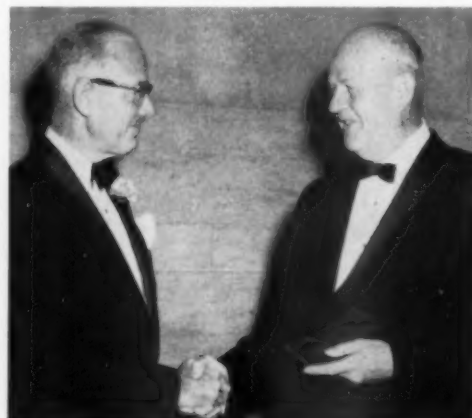
Establishment of a Pacific Coast sales region for Fairbanks, Morse & Co. was announced today by Alfons Landa, Fairbanks-Morse chairman. Roger M. Murray, who for 26 years has been manager of the San Francisco branch of Fairbanks-Morse, was named vice president in charge of the region. This marks the first step in sales regionalization for Fairbanks-Morse. The area in the region includes all or part of 11 states—all of California, Oregon, Washington, Idaho, Nevada, Arizona, Utah, Hawaii, Alaska, and parts of Montana and Wyoming. The purpose of streamlining the west coast sales organization is to simplify operations and achieve a better sales management, Mr. Landa said. Vice president Murray is a veteran of 43 years with Fairbanks-Morse. A native of Oakland, Calif. and a graduate of John C. Fremont High School in Oakland, he joined Fairbanks-Morse in San Francisco on July 31, 1916.



R. M. Murray

Since then he has worked also in Beloit, Sacramento, and Salt Lake City. He became manager of the diesel engine department in San Francisco in 1931 and manager of the San Francisco branch in 1933. The change brings under one control sales headquarters in Portland, San Francisco, and Los Angeles which in the past have been operating in direct relationship with the Fairbanks-Morse headquarters in Chicago and the Fairbanks-Morse factories.

GM, Electro-Motive Honored



Cyrus R. Osborn, executive vice president of General Motors Corp., (right), accepts the George R. Henderson medal on behalf of GM's Electro-Motive Division from Wynn Laurence LePage, Franklin Institute president, at the Institute's annual Medal Day award ceremony. General Motors was honored for developing and mass producing the diesel-electric locomotive widely used to carry America's commuters and freight. General Motors and 17 men received awards from the 135-year-old scientific and educational organization for scientific and technological contributions. The Franklin Institute's highest award, the Franklin Medal, was given to Dr. Hans A. Bethe, noted theoretical physicist and Cornell University physics professor.

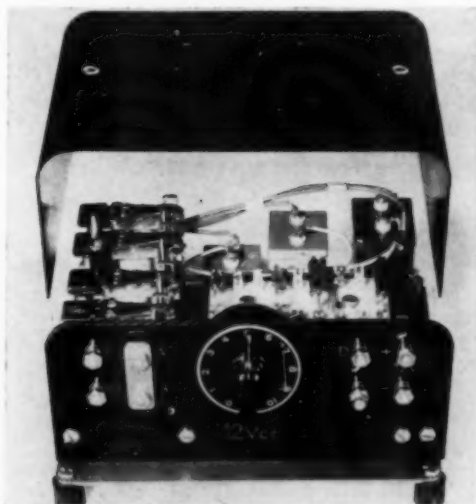
Enterprise Sales Awards



Climaxing the recent general sales and service meeting of Enterprise Engine & Machinery Co., General Metals sales subsidiary, was the honoring of sales and service engineers. Austin Crouchley (right), New York branch manager, was honored for having achieved the highest sales volume. C. Wilson (2nd from left) of Power Equipment Co., Enterprise distributor in Kansas City, and Dave Bain (left), Enterprise service engineer of San Diego, won awards for making the best contributions to the success of the week-long conference held at the Castlewood country club in Pleasanton, Calif. William E. Butts (center), president of General Metals and Arthur W. Ostrander (2nd from right) vice president for sales, made the awards.

Automatic Standby Unit Primer

A fully automatic priming unit to reduce the time lag in starting standby diesel equipment has been developed by Start Pilot Corp. The priming unit, model 964 has been designed to spray each cylin-

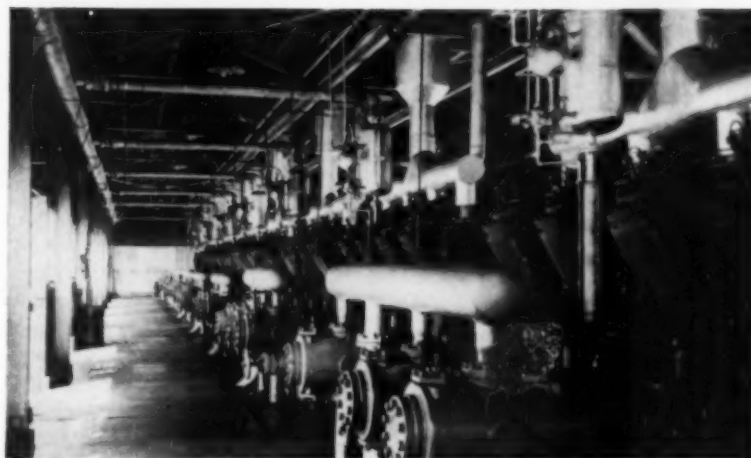


der in an engine for a period up to 10 seconds, beginning within .2 second after the normal power supply has been cut. The unit was developed to aid the standby units in getting up to full power load level within the shortest possible time. Tests of the primer in hospitals, aluminum plants and atomic installations have shown that the peak power load can be obtained almost immediately, the maker states. For more information write Start Pilot Corp., Mineola, N. Y.

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Vapor Phase Units on each of eight gas engine compressors.

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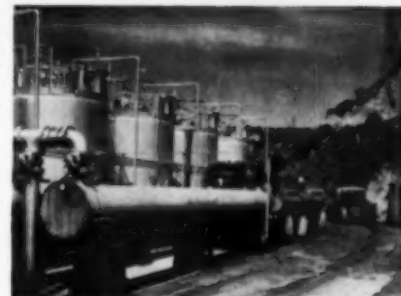
Power at the VLW Lease Gas Compressor Station consisted of eight Gas Engine Compressors of 2250 BHP total.

Engines were cooled by large radiators with fans, driven by separate multiple cylinder gas engines.

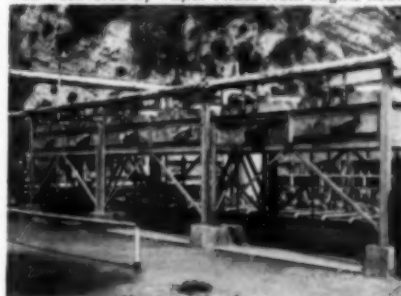
Gas-Fired Oil Heaters were used to separate water and sludge from crude oil. Therefore Tidewater had the cost of additional engines and fuel to coal compressors, plus fuel cost to heat oil.

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1. Engines are cooled by thermal circulation providing uniform temperature throughout the engine.
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3. Recovered heat from the engines produced 6750 pounds steam per hour which is fully utilized.
4. Gas-Fired boiler is eliminated.
5. 4,000 pounds of steam per hour heats the crude oil to separate water and sludge from oil.
6. Excess steam is used to heat the workmen's locker room and to drive a steam turbine for the standby condenser-engine cooler.
7. Engine maintenance is reduced.



Crude Oil Treaters operated by 4000# steam per hour recovered by Vapor Phase from engine heat.



Excess steam drives turbine for standby condenser.



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West Coast News

By James Joseph

ABUILDING in Vancouver, B.C.'s Matsumoto & Sons shipyard is Canadian industrialist John David Eaton's 94 ft. double-ended diesel yacht—to be powered by a pair of 200 hp Mercedes-Benz engines driving thru 3:1 reduction gears.

TO Springfield, Ore. James Bros. Logging Co., an Allis-Chalmers 21000 diesel (340 hp at 2000 rpm) to repower a Skagit BX-135.

POWERING the newly launched 41 ft. cruiser *Aerial II*, owned by George C. Thomas III, Chatsworth, Calif. are twin GM 4-71 inclined Detroit diesels swinging 26x26 in. props thru 2:1 reduction.

Clayton DYNAMOMETERS INSURE PEAK PERFORMANCE and LOWER SERVICE COSTS



Clayton Chassis Dynamometer checks all engine and drive line functions under simulated road driving conditions. It makes possible fine tuning adjustments to produce power-proved performance without road testing.



Clayton Engine Dynamometer checks any engine—gasoline, diesel or L.P.—for horsepower output and over-all performance under varying torque loads. It allows power testing and running-in of new or overhauled engines before placing in service.

Clayton CHASSIS & ENGINE
DYNAMOMETERS

CLAYTON MANUFACTURING CO.
443 North Temple City Blvd., El Monte, Calif.

300

DELIVERED: to A. A. Wolfe & Sons, Pomona, Calif. a Lister-Blackstone HA-3, 33 hp at 1800 rpm, coupled to Vickers hydraulic pump—for powering a crane.

SOLD to Golden Valley Power Association, Big Delta, Alaska, two Caterpillar D353 diesel electric sets. Sale by Northern Commercial Co.

FOR the motor vessel *Jinney C*, owned by Chet Carlson, Seattle, a model 21000 Allis-Chalmers marine engine with 4½:1 Capitol gear.

INSTALLED: in the motor vessel *Frank F*, owned by Seattle's Rollin Crump, a model 21000 Allis-Chalmers marine diesel with 3:88:1 Capitol hydraulic gearing. Sale by Seattle's Pacific Fishing and Trading Co.

DELIVERED to General Hotels Inc., Stovepipe Wells, Calif. (Death Valley), a Cummins HRC4 (60 hp at 1200 rpm) to power a 40 kw generator set.

REPOWERING a Euclid ore truck for Kaiser Steel's Eagle Mt. mines is a Cummins NHRS-6-BI diesel (300 hp at 2100 rpm). Sale by Cummins Service and Sales of Los Angeles.

TO Weyerhaeuser Timber Co., Vail, Wash., a model 16000 Allis-Chalmers truck engine to repower an off-highway logging truck.

SOLD: to Green-Tecon Construction Co. a 17CK Torcon converter to be used in a 54-B Bucyrus. Company operates in Oregon.

CLIFFORD E. and Pauline Terry, logging contractors, Elgin, Ore., have taken delivery of a 599-C American Log Loading unit powered by a 16000 Allis-Chalmers diesel engine with 15AKFOG Clark converter.

TWO GM diesels power the new 60 ft., twin screw Hacker cruiser *Billedick V*, owned by Wm. C. Warmington, staff commodore of the Newport Harbor (Calif.) Yacht Club.

Bendix Filters Sales Engineer

Appointment of William B. Likens as sales engineer for Bendix Filter Division, Bendix Aviation Corp., was announced by M. J. Kennedy, general manager of the division. Likens will maintain offices in Dayton, O. He will provide sales and application engineering assistance to users of high performance filters in the aircraft, missile, automotive, agricultural and industrial machinery fields. He was formerly associated with the Allison Division of General Motors as a sales engineer and service representative. He is a graduate of Franklin and Marshall College in Pennsylvania.

E. L. Miller President of Diesel Engine Manufacturers

Eugene L. Miller, President, The Cooper-Bessemer Corp., Mt. Vernon, O., was elected president of the Diesel Engine Manufacturers Association at their annual meeting. Mr. Miller, a vice president and director of the association, succeeds John N. MacKendrick, chairman of the board, Clark Bros. Co., Olean, N. Y., a division of Dresser Industries. Elected as vice presidents of the association are George Steven, general manager, Worthington Corp., Buffalo, N. Y., and William E. Butts, president, General Metals Corp., Oakland, Calif. Re-elected treasurer of the association is Robert H. Morse, Jr., vice-chairman, Fairbanks, Morse and Co., Chicago, and re-elected as executive secretary is Robert L. Stanley of Falls Church, Va.

The following were elected as directors of the Association:

W. F. Boyle, Baldwin-Lima-Hamilton Corp.

W. F. Burrows, The White Motor Co.

W. E. Butts, General Metals Corp.

O. H. Fischer, The Union Diesel Engine Co.

R. E. Friend, Nordberg Manufacturing Co.

T. E. Hughes, Cleveland Diesel Division, General Motors Corp.

J. C. Huvane, Chicago Pneumatic Tool Co.

J. N. MacKendrick, Clark Bros. Co.

E. L. Miller, The Cooper-Bessemer Corp.

R. H. Morse, Jr., Fairbanks, Morse and Co.

E. J. Parish, Ingersoll-Rand Co.

G. Steven, Worthington Corp.

Headquarters of the association is at 2000 K. St., N. W., Washington 6, D.C.

ALCO Locomotive Order

Orders for 59 diesel-electric locomotives worth more than \$13 million were announced by ALCO Products, Inc. The firm's transportation division said it recently received orders from the Atchison, Topeka & Santa Fe for 25 low-profile 2400 hp DL-600 road switchers; an order for 10 additional DL-600's from another domestic railroad, and from the National Railways of Mexico for 16 DL-702 1800-horsepower road switchers and eight 1000 hp switchers. Deliveries of the locomotives on the orders announced today will be completed by mid 1960. ALCO earlier this year delivered 24 similar six-motor low-profile locomotives in the 2400-horsepower class to the Santa Fe, where they entered immediate freight service between Kansas City and the West Coast. All of the locomotives on the three orders will be powered by ALCO's 251 turbosupercharged engine.

24 Channel Oscillograph

The Heiland division of Minneapolis-Honeywell Regulator Co., has introduced a new direct-recording oscillograph described as the lowest in cost-per-channel of the three members of its popular Visicorder family. Known as the 1108 Visicorder, the new model is designed to allow high-speed recording of up to 24 channels of scientific and test data simultaneously. Maximum recording capacity of the earlier 906 and 1012 model Visicorders is 14 and 36 channels, respectively. The new model allows direct recording of up to 24 channels of high-frequency, high-sensitivity information from dc to 5000 cps. Chart speeds, which are adjustable in 15 variations from .05 to 80 in. per second, are push-button-selected. The 1108, as well as the other two members of the Visicorder family, is a dry and dustless direct-recording oscillograph that produces instantly-readable records without the use of powders, inks, styli, heat, electrostatic charge, liquids, vapors or other chemical or darkroom processing. The light source is a high-pressure mercury vapor lamp with maximum output in the ultraviolet region. This, combined with the specially designed optical system and record paper with maximum sensitivity to ultraviolet radiation, produces immediately readable records. Developed

and pioneered by Honeywell, the Visicorder principle was introduced in 1956. Detailed information of the model 1108 Visicorders and the other two available models may be obtained by writing to Minneapolis-Honeywell's Heiland Division, 5200 East Evans Ave., Denver 22, Col.

ITS NEW

Cooper-Bessemer Announces Major Canadian Expansion

A major expansion program in Canada has been launched by The Cooper-Bessemer Corp., Mount Vernon, O., company president Eugene L. Miller announced. Through its wholly-owned subsidiary, Cooper-Bessemer of Canada, Ltd., the firm will begin manufacturing operations in a plant leased from the Canadian National Railways at Stratford, Ontario. Since 1949, Cooper-Bessemer of Canada, Ltd. has served as a marketing organization with warehouse and service facilities. The opportunity to manufacture in Canada came about through the availability of the Canadian National Railway plant at Stratford, Ont., consisting of buildings, cranes and some machine tools suitable for construction of heavy equipment. It has been predicted that by 1980, production of natural gas and oil in Canada will be up as much as 790% over 1960. Cooper-Bessemer is a leading producer of heavy

equipment for these industries. Plans call for the immediate use by Cooper-Bessemer of some 60,000 sq. ft. of the 200,000 sq. ft. facility. Employment will start at less than 100 people, may eventually reach 500. Cooper-Bessemer anticipates that future Canadian business will permit gradual expansion of the manufacturing facility until the entire shop area is utilized.

Diesel and Gas Engine Progress Moves Executive Offices

The executive offices of DIESEL AND GAS ENGINE PROGRESS have been moved to 9110 Sunset Blvd., Los Angeles, Calif. The editorial and production offices of the magazine remain at 1701 W. Wisconsin Ave., Milwaukee, Wis.

The Los Angeles office will continue to handle all advertising and editorial material relating to the DIESEL AND GAS ENGINE CATALOG. Material for the monthly magazine will be processed through the Milwaukee office.



TOP TOWING POWER PULLS OWNER'S PROFITS TOPSIDE!

Opposed Piston Power pulls *GREATER LOADS*
for *GREATER PROFITS*—at far less cost!

A new towing firm, Mid-South Towing of Tampa, launches a new boat, "Girly Knight"—and sails smoothly into the profit picture!

HOW COME?

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Waukesha Manufacturing Manager Appointed

Mr. A. Foster Sheller has been named manufacturing manager of the Waukesha Motor Co. in an announcement by James E. DeLong, president. In his new position, Sheller will supervise and coordinate activities of the departments within the organization directly concerned with, or closely related to the manufacturing process. These include purchasing, tool design, plant engineering, personnel, inspection, production, manufacturing, rate and time study, and the Climax plant at Clinton, Iowa. Mr. Sheller is a graduate of Iowa State College with a BSEE degree. He attended the Harvard Graduate School of Business Administration and in 1928 was awarded the degree of master of business administration. In 1930 he joined the Le Roi Co. in West Allis, Wis., where he was elected a director of the company and made vice president in charge of manufacturing. He left Le Roi

to become vice president of manufacturing for the Phoenix Hosiery Co. in Milwaukee, where he remained for fourteen years, until 1956. In August, 1957, after acting as a management consultant, he joined the Waukesha Motor Co.

Amot Controls Representatives

The Fred M. Erichson Co., 5705 St. Roch Ave., New Orleans, has been named representative for the Amot Controls Corp. The firm will handle Amot's line of thermostatic controls and valves.

Great Lakes Diesel V.P.

The board of directors of Great Lakes Diesel Co., Cleveland, announced the election of Daniel R. Harwood as vice-president of the company. Mr. Harwood will continue as sales manager, a position he has held for the past three years. Great Lakes Diesel Co. is the General Motors Diesel distributor in northern Ohio.

REA News

TWO electric loans for new engine generating facilities have recently been approved by the Rural Electrification Administration and announced by the U. S. Department of Agriculture.

ALASKA Dillingham Public Utility District No. 1, Dillingham, Alaska, \$596,000 loan. These funds will enable the District, a new REA borrower, to provide generation and distribution facilities to serve Dillingham and surrounding rural areas, including the village of Aleknagik. Approximately half of the funds will finance the installation of a 600 kw diesel generating plant and related facilities at Dillingham. It is estimated that the new plant, plus an existing 300 kw diesel unit, will meet the borrower's power requirements through 1968.

The remainder of the loan will finance the construction of 30 mi. of distribution line to serve 53 new rural consumers. The new line plus 7 miles of existing distribution line will make it possible for the borrower to serve a total of 225 consumers, including 172 consumers served by its present system. Mr. Albert W. Ball is president of the Dillingham Public Utility District No. 1.

MICHIGAN Western Michigan Electric Cooperative, Scottville, Mich., \$470,000 loan. These and funds from prior loans will enable the borrower to install a 1750 kilowatt dual fuel generating unit and related facilities at its existing Scottville plant. The new unit will bring the generating capacity of the plant up to 4970 kw. The borrower anticipates that the enlarged plant, plus its interconnection with the Wolverine Electric Cooperative, will give it sufficient power to meet its consumer requirements through 1969. Western Michigan now operates 848 mi. of line, including 41 mi. of transmission line, and furnishes electric power to approximately 4,400 rural consumers in Lake, Manistee and Mason counties. Mr. Leo LaPointe is president and Leon D. Bradley is manager of the Western Michigan Electric Cooperative.

White Chief Engineer

E. R. Sternberg has been appointed chief engineer of White Truck Division, The White Motor Co., it was announced by H. J. Nave, executive vice president. Mr. Sternberg joins the division after three years as chief engineer of the company's Autocar Division at Exton, Pa. He came to White from Sterling Motor Company when White purchased Sterling in 1951. He worked on special assignments with White Motor until being named Autocar's chief engineer in 1956.

Packaged Compressors Bulletin

A new 8 page bulletin describing construction and operating features of Cooper-Bessemer AM/2 and AM/4 packaged compressors for gas gathering is available from The Cooper-Bessemer Corp. Bulletin 91 discusses the incorporation of large compressor concepts in these compact, heavy-duty units. Construction details are given on both the two-throw type and the four-throw type, covering the complete range from 100 hp up. A number of types and sizes of compressor cylinders can be furnished for either model, at discharge pressures up to 6000 psi. Cooper-Bessemer manufactured, the compressors are skidded, prepiped and provided with a closed water system by C-B Southern, Inc., Houston, Tex. For Bulletin 91, write The Cooper-Bessemer Corp., Mount Vernon, O.

(ITS NEW)

Wind Tunnel Facility

Harrison Radiator Division, General Motors Corp. has acquired the wind tunnel facilities at the GM technical center in Warren, Mich. According to Fredric C. Ryan, Harrison's chief engineer, the tunnel is a single purpose tunnel in that it is primarily a "hot" tunnel capable of providing temperatures in the 70 to 110 degree range. However, it can be used to test a variety of automotive components. Harrison will use the new facility for testing radiators and car air conditioning units. Harrison customers will have the tunnel available to them for brake tests, carburetor vapor lock tests and engine development tests.

Miami International Boat Show

The 20th Annual Miami International Boat Show, "The South's Greatest Marine Exposition", will open in the Dinner Key Auditorium on February 19th. The show will run through February 24th. Over 225 manufacturers and distributors of boats, marine engines and their accessories, valued in excess of \$1.25 million dollars will be represented at the exhibit. Made fast to the huge Dinner Key Auditorium, will be a wide range of vessels from large dieselized flying bridge cruisers to small dinghys powered by the new American Marc diesel outboard motor. And as usual some boat and engine manufacturers will feature actual water demonstrations on the turquoise blue waters of Biscayne Bay. Inside the auditorium, diesel engine manufacturers will play a prominent part in the marine display. Detroit Diesel Division of General Motors will have their fine exhibit, Cummins Engine Co. will feature some of their new marine diesel engines, Waukesha and Volvo plus Gray Marine diesels and others will also be displayed.

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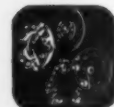
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CLUTCHES



Small Spring Loaded



Heavy Duty Spring Loaded



Oil or Dry Multiple Disc



Heavy Duty Over Center



Power Take-Offs



Speed Reducers

1960 Service School Schedule

GM Diesel's 1960 service school schedule has just been announced by Chester B. Clum, general service manager for the division. Programs of one, two, and three weeks covering construction, operation, and maintenance of GM Diesel engines have been planned and scheduled throughout 1960. Special two-week power generator programs have been included in this year's schedule for those interested in the application and installation of power generators. Copies of the 1960 schedule can be obtained from GM Diesel distributors and dealers.

New Superalloy Performance Data

Two new technical bulletins covering performance data on vacuum induction melted *Waspaloy* and M-252 superalloys have just been released by metals division of Kelsey-Hayes Co. Each bulletin is 8 pages and includes: alloy description and chemical composition, physical constants, tables and charts on mechanical properties, isostress curves, and information on heat treatment and finishing.

Both *Waspaloy* and M-252 are high-temperature, high-stress superalloys produced by the vacuum induction melting process. They are presently being used in jet engines, missiles, electronic tubes, and process and nuclear-industry applications. For copies of the bulletins or for more information, write Dept. 16, Metals Division, Kelsey-Hayes Co., New Hartford, N. Y.

ITS NEW

Scholarship Awards

The Society of Naval Architects and Marine Engineers has announced that it will continue, in 1960, the award of scholarships for undergraduate and graduate study. Accordingly, the society is receiving, at this time, nominations for the four scholarships for graduate study which it has been offering each year in the past. Application forms are being forwarded to important segments of the ship operating and shipbuilding industries, and affiliated trades, and to universities located in all sections of the country. The applications should be filed with the secretary of the society, Captain W. N. Landers, USN (Ret.) at 74 Trinity Pl., New York 6, N. Y., be-

NEW AND NOW AVAILABLE! The completely new 1959 edition of the **DIESEL ENGINE CATALOG**, Volume 24 can now be purchased. If you design, purchase, sell, operate or service diesel, dual fuel or gas engines, the Catalog is essential to you. This giant, 400 page, 10 1/2" x 13 1/2", fully illustrated reference book has been revised, rewritten and brought up to date completely from cover to cover. Send your order in now for this limited edition, which costs \$10 postpaid anywhere in the world. Send checks or company orders to **DIESEL ENGINE CATALOG**, 9110 Sunset Blvd., Los Angeles 46, Calif.

fore February 1, 1960. The maximum value of each scholarship has been set at tuition at the college selected, plus \$1,600 for living expenses.

Florida Pipeline Featured

"Pipe Dream Come True" is the title of the feature article in the Winter 1959 issue of *Twin Disc Clutch Co.'s* magazine *Production Road*. The story deals with the laying of 1,500 mi. of pipe through the treacherous Florida swamps to bring the first natural gas to the peninsula's southern tip. Another story of special interest covers the development of the Vertol 76 VTOL Aircraft. This unique "airplane of the future" takes off like a helicopter and flies like a fixed-wing craft. Also in this 16 page issue of *Production Road* are articles on the construction, oil field, marine, and machine tool industries.

For a copy of the magazine write The Editor, *Production Road*, Twin Disc Clutch Co., Racine, Wis.

Elliott-Carrier Managers

Frank M. Fives and Walter A. Snow, sales and engineering managers, respectively, will head the new industrial air and gas compressor department at Elliott Co., a division of Carrier Corp., Jeannette, Penn. Engineering and sales of industrial compressor lines, formerly divided between the machinery and systems division of Carrier, at Syracuse, N. Y., and the Elliott Co., are now consolidated at Jeannette. Range of the compressors will be up to 500,000 cu. ft. per minute, and as much as 1500 lbs. pressure per sq. in. Mr. Fives has been associated with the industrial compressor field for 20 years, except for a four-year term as a Navy submarine engineering officer in World War II. He has been with Carrier Corp. for 15 years. Mr. Snow was a research engineer at Elliott Co. and duPont Corp. before joining Carrier in Syracuse five years ago.

GM Diesel Brochure

An attractively-illustrated brochure showing GM Diesel marine engines for pleasure boats and work boats has just been released by the Detroit Diesel Engine Division. Covered are the "53", "71" and "110" series. Power ratings, dimensions and weights are given on 34 single and multiple engines, including models for single and twin screw installations for boats from 23 ft. and up. The brochure, "GM Diesel Marine Engines for Pleasure, for Profit", is available from GM Diesel distributors and dealers or by writing the Advertising Department, Detroit Diesel Engine Division, General Motors Corp., Detroit 28, Mich. Refer to symbol #8SA57.

ITS NEW

Awarded \$4,000,000 Compressor Contract

An order for 10 of its largest engines and centrifugal compressors for mainline gas transmission service has been awarded to The Cooper-Bessemer Corp. by The Transwestern Pipeline Co., Houston, Tex. The units will be installed in the mainline compressor stations of Transwestern. This newest order, in excess of 4 million dollars, is for compressor machinery for Transwestern's 30 in. gas pipe line running from the Texas and Oklahoma gas fields to the California border near Needles, Calif. The gas engines are turbocharged Cooper-Bessemer type LSV-16 cylinder units. The centrifugal compressors, Cooper-Bessemer Type RFB-24 are direct driven by the LSV engines through speed increasers. An important and highly significant feature of this new gas line will be the automatic control of the entire mainline system from one remote point.

Gulf Interstate Company has designed and is supervising the construction of the pipe line system. The initial system is comprised of 5 mainline stations, each station having 2 of the Cooper-Bessemer engine-driven centrifugal compressor units.

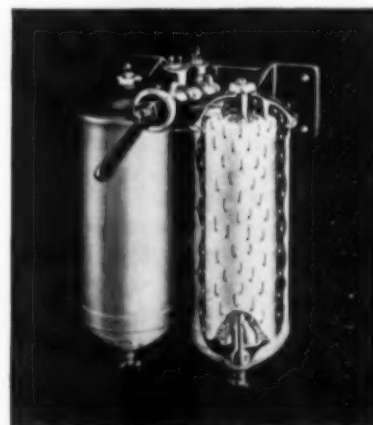
Convention Exhibits

Cummins Engine Co., Inc. will exhibit the following at the Sand and Gravel and Crushed Stone Conventions to be held in Chicago in early 1960:

- 130 h.p. JN-130 cutaway engine
- 220 h.p. NH-220 cutaway engine
- 335 h.p. NR10 cutaway engine
- 600 h.p. VT-12 cutaway engine

Cummins will also exhibit an NHRS-6-1 torque converter unit. The Sand and Gravel Show will be held February 15-19 and the Crushed Stone Show will be held February 22-24. The Cummins exhibit will be at the Conrad Hilton Hotel during both conventions.

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Avoid downtime with this duplex Fulflo Filter — for fuel or lube oil, for large or small engines. Two, four, or eight individual filters, mounted on common head, have control valve for alternate or parallel operation. Either side may be serviced while other is filtering.

Patented Honeycomb Filter Tubes provide true *depth* filtration through hundreds of engineered tapered filtering passages of controlled porosities.

The Fulflo Duplex Filter is just one in the complete line of CFC Filters for fuel and lube oil, full-flow or by-pass filtration. Write for catalog to Dep't DS

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MELROSE 76, MASSACHUSETTS

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NO WEARING PARTS

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- ▶ Free End Float
- ▶ Smooth Continuous Drive with Constant Rotational Velocity
- ▶ Visual Inspection While in Operation
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NANCY MORAN — 1600 hp



ATHENA — 820 hp



HAZEL — 1200 hp



LORRALENE — 1600 hp



BARNEY TURECAMO — 1600 hp



R. H. GOODE — 1600 hp



UTAH — 1200 hp



DALZELLEAGLE — 1600 hp



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IRVING T. BUSH — 1200 hp



RUSSELL 10 — 1600 hp



NIAGARA — 1200 hp



FLO W. — 1600 hp

propulsion drives through Wichita Clutches



Harry A. Crouch, Superintendent, Edgar G. Hill Compressor Station of Michigan Wisconsin Pipe Line Company, points out an engine feature to Frank Tuttle, Division Supervisor (right), and James Davis, Engineer (left), and explains...

How our 15 Cooper-Bessemer Compressors have set a 10-year performance record

"On November 1, 1949, we put our first five Cooper-Bessemer Compressors on the line. Ten more were added during the next year. All 15 of these 2400 hp Cooper-Bessemer units... one of the world's biggest compressor horsepower installations under one roof... have operated 'round the clock, without interruption, averaging 72,000 to 78,000 total hours. Monthly operating and maintenance costs are averaging only \$2.03 per installed horsepower.

"The fact that our Cooper-Bessemer engines have run the equivalent of 2200 times around the globe in an auto at 50 mph—a distance of over 50 million miles—points up the rugged dependability and superior design of these units. Their excellent performance record has fully justified our most confident expectations," says Mr. Crouch.

We will gladly help you assure this kind of performance for your engine and compressor operations. Call our nearest office when you start planning new or expanded facilities.

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